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South Pacific bulletin

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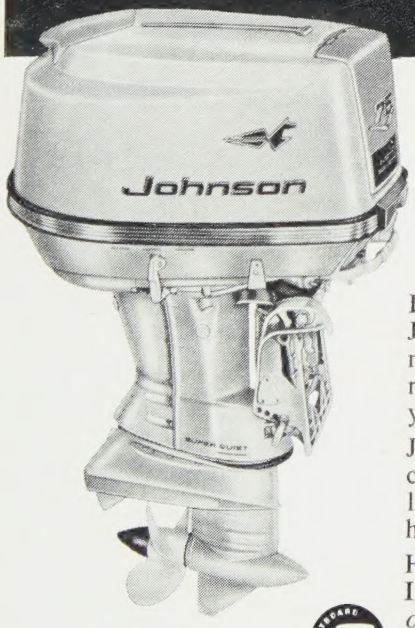

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The South Pacific Commission is an advisory and consultative body set up in 1947 by the six Governments responsible for the administration of island territories in the South Pacific region (Australia, France, the Netherlands, New Zealand, the United Kingdom and the United States of America).

The Commission's purpose is to advise the participating Governments on ways of improving the well-being of the people of the Pacific island territories. It is concerned with health, economic and social matters. Its headquarters are at Nouméa, New Caledonia.

The Commission consists of not more than twelve Commissioners, two from each Government. It normally holds one Session each year. There are two auxiliary bodies, the Research Council and the South Pacific Conference.

There is a Research Council meeting once a year. This may be either a meeting of the full Council, or of one or other of its three main sections, specialising in the fields of health, economic development and social development. Members of the Research Council are appointed by the Commission. They are selected for their special knowledge of the questions with which the Commission is concerned, and the problems of the territories in these fields. The chief function of the Research Council is to advise the Commission on what investigations are necessary. Arrangements to carry out those that are approved are the responsibility of the Secretary-General and other principal officers.

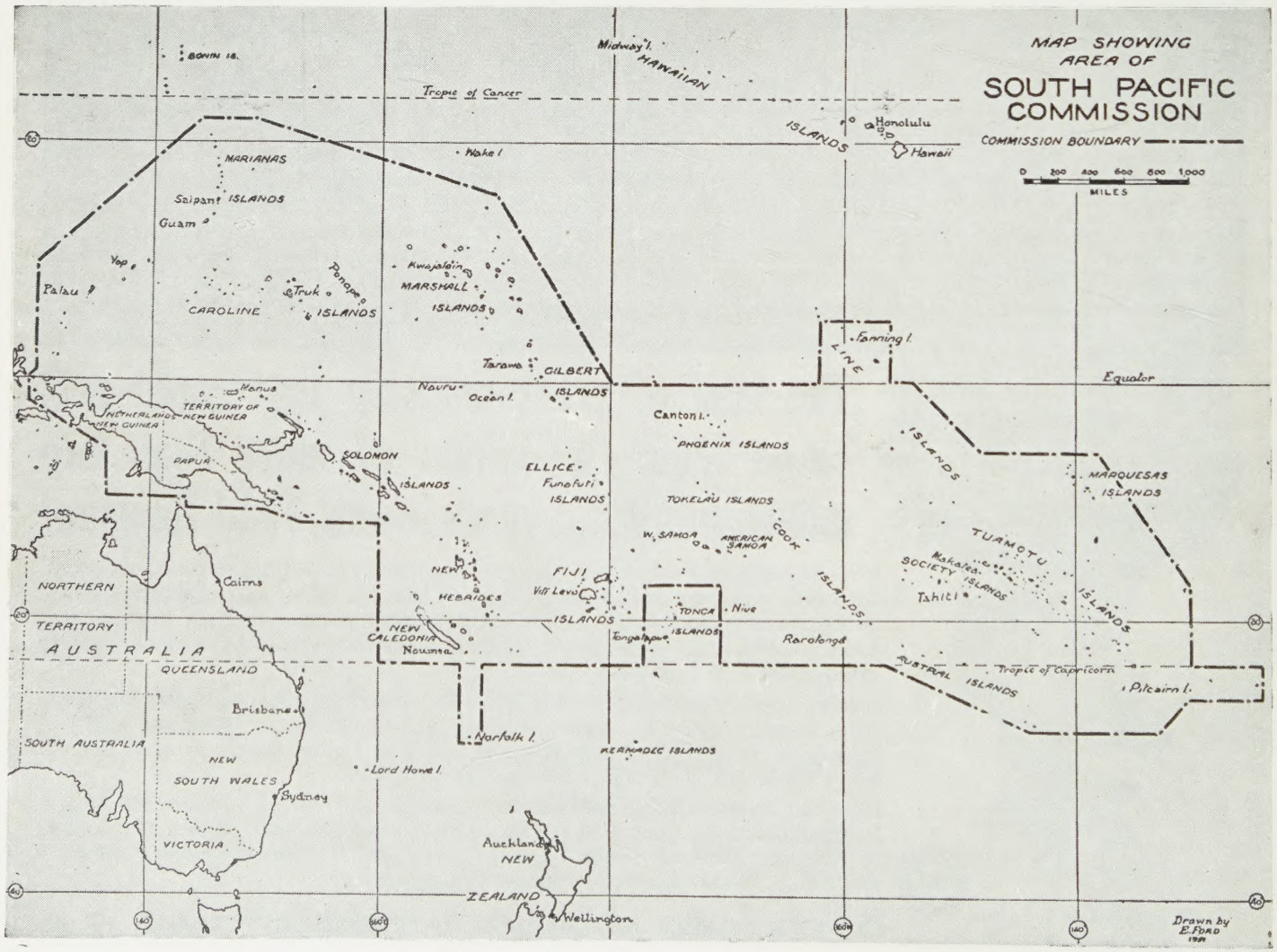
The South Pacific Conference, which meets at intervals not exceeding three years, consists of delegates from the local inhabitants of the territories, who may be accompanied by advisers. The first Conference was held in Fiji in April 1950, and was attended by delegates from fifteen territories and from the Kingdom of Tonga. The second Conference was held at Commission headquarters in April 1953. The third Conference was held in Fiji in April-May 1956, and the fourth Conference in New Britain in April-May 1959.

The principal officers of the Commission are: Secretary-General, Mr. T. R. Smith; Executive Officer for Social Development, Dr. Richard Seddon; Executive Officer for Economic Development, Dr. Jacques Barrau; Acting Executive Officer for Health, Dr. W. Norman-Taylor. The powers and functions of the Deputy Chairman, Research Council, are exercised by the Secretary-General.

Further particulars of the Commission's activities may be obtained from the Secretary-General, Nouméa, New Caledonia.

FRONT COVER PHOTOGRAPH

Herman Pulanda and Jason Makabori, both from Netherlands New Guinea, mixing photographic solutions in the darkroom at the SPC Literature Production Training Centre at Honiara, British Solomon Islands. (Activities at the Centre are described in an article beginning on page 44.)



SOUTH PACIFIC BULLETIN

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EDITOR: *A. E. Read, B.Sc.*

THE SOUTH PACIFIC BULLETIN, first published in January, 1951, features articles on selected activities in the Commission's three main fields of operation: economic development, health and social development. Articles are also contributed by specialists working in these and related fields, in the territories within the Commission area.

THE BULLETIN is given selective world distribution to people and institutions in widely differing fields sharing a common interest in the purposes and work of the Commission. It is published in two editions, English and French.

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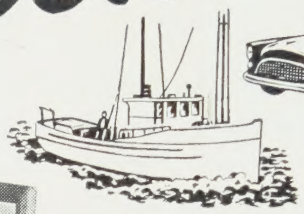

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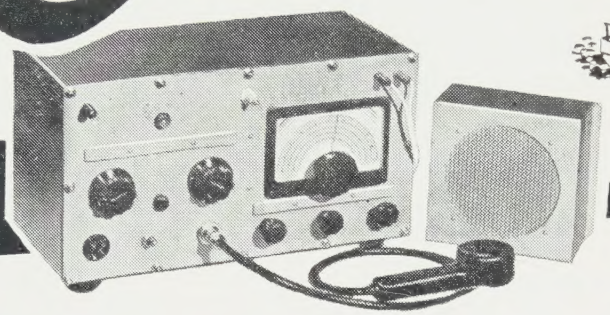

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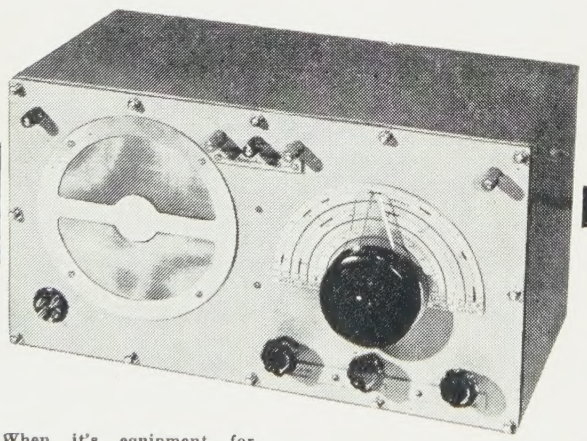

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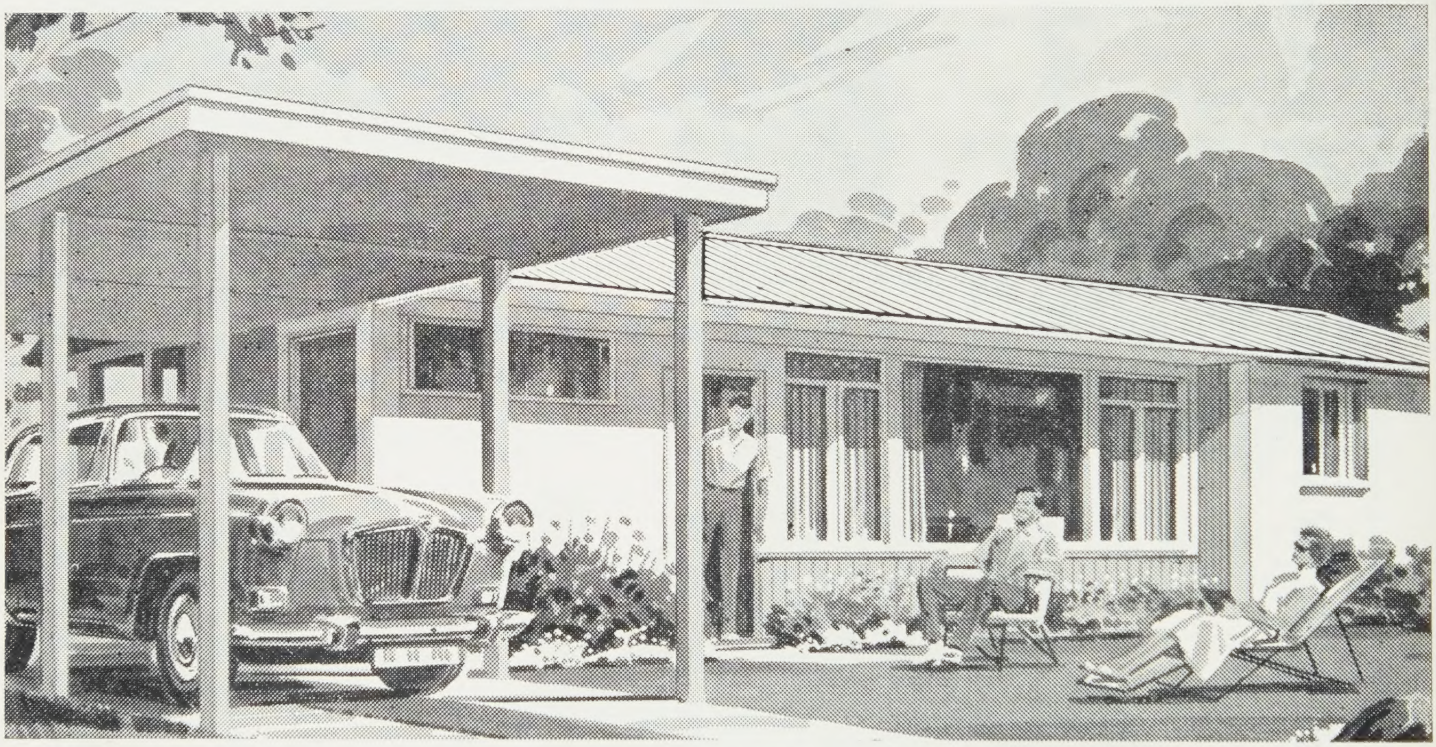

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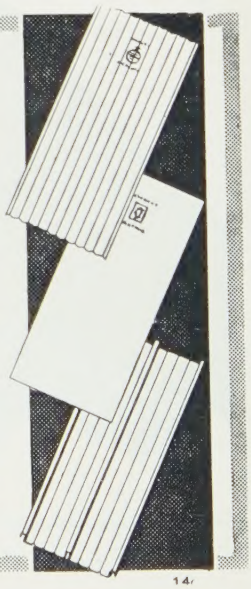

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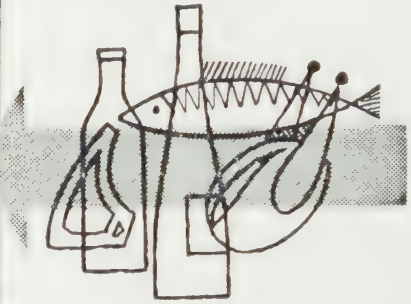

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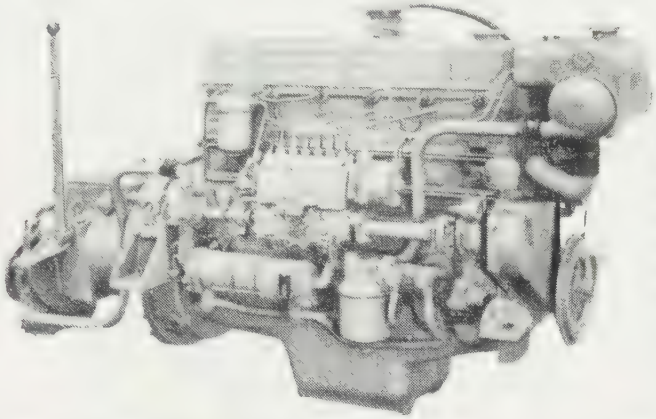

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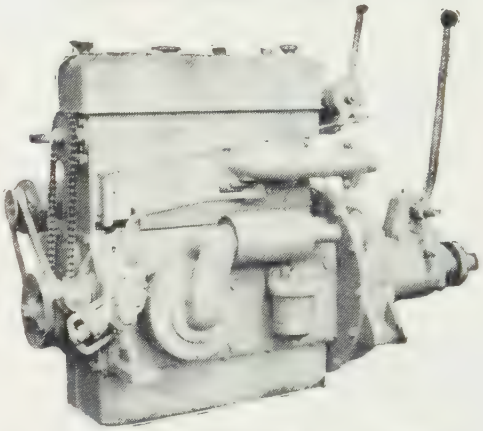

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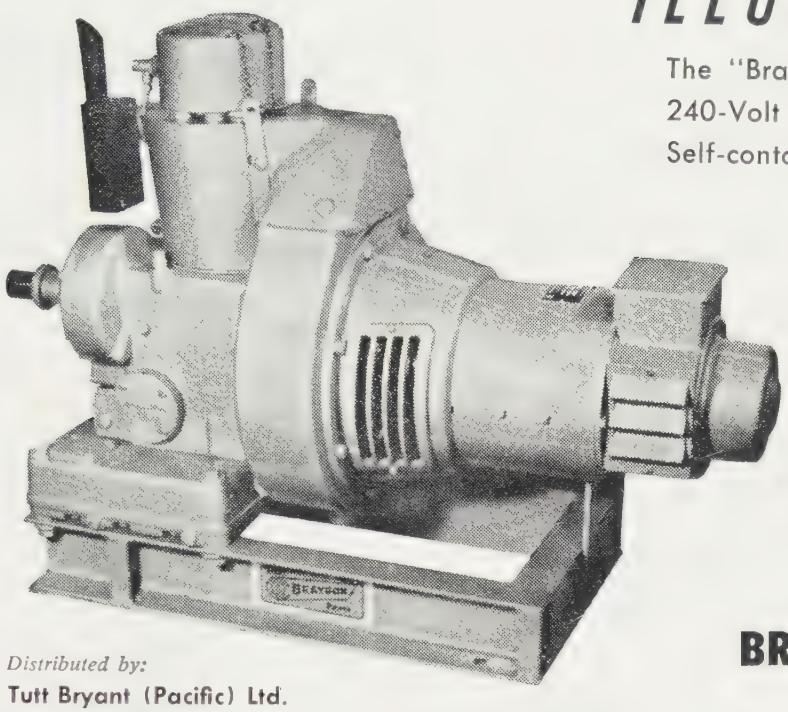

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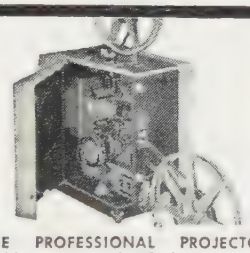

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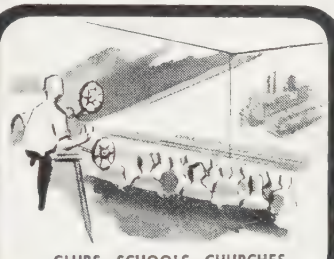

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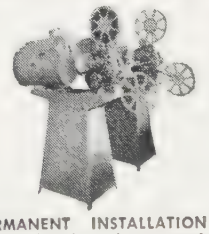

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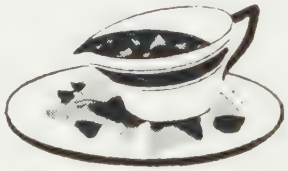

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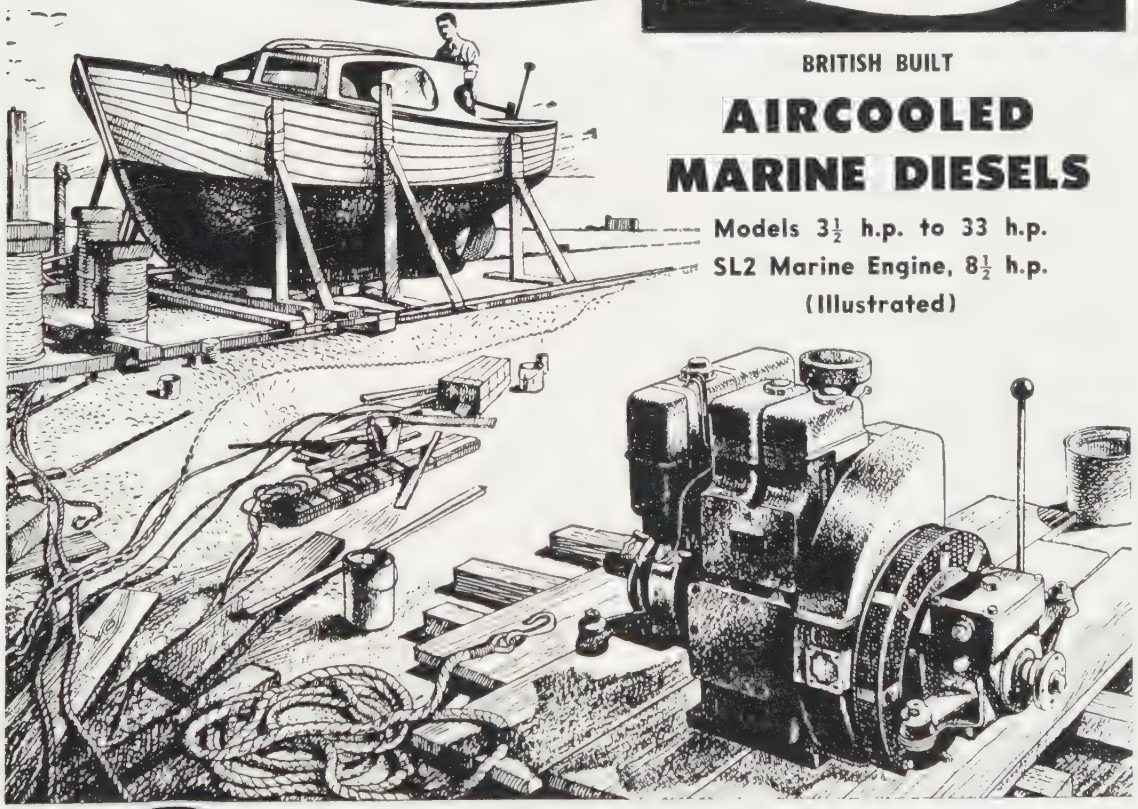

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Prof. A. H. Banner and Dr. Philip Helfrich, biologists, discuss recently-received information of toxic fish on Rossel Island in the New Guinea area. The black pins on the map indicate recent reports of fish poisoning of the ciguatera type.

Fish Poisoning In The Tropical Pacific

For over three years, scientists at the Hawaii Marine Laboratory, University of Hawaii, have been investigating a common type of fish poisoning in the tropical Pacific which sometimes causes serious illness, and occasionally death. The National Institutes of Health of the United States and the South Pacific Commission are co-operating in this study.

By A. H. BANNER*

IF you anchored off the entrance to the lagoon at Palmyra Atoll, a small island about one thousand miles south of Honolulu, you could catch a large delectable red fish—the red snapper—esteemed as food in many parts of the Pacific, where it is variously known by the European names of the red bass, the red emperor, *l'anglais,* or by the scientific name of *Lutjanus bohar.* The fish are so abundant at that uninhabited atoll that your bait often cannot reach near the bottom before it is taken by a ten-pounder. And if you ate a sizable portion of one of these large fish, there is almost a one hundred per cent chance that you would be mildly to seriously poisoned thereby.

You would initially develop severe gastro-intestinal upset, with diarrhoea and vomiting; soon your skin would tingle and itch, especially around the mouth and on the palms of your hands; later you would notice an aching of the joints of the arms and legs, and a marked weakness in the legs. With a large enough serving you would develop paralysis, and perhaps drop into a coma and die. If you consulted a doctor he could give you no proven remedy for the disease—merely drugs that would alleviate the symptoms.

You would have developed the type of fish poisoning known as *"ciguatera* poisoning" in scientific literature, or popularly as *"la gratte"* in New Caledonia.

Yet if you went to Washington Island, of the same chain and only about 120 miles away, you would find the Gilbertese on the coconut plantation eating these fish as a large part of their usual diet, and never suffering from poisoning.

Similarly, throughout the tropical Pacific you will find areas where the fish are reported to be toxic. From one side of a bay on Moorea the Tahitians will eat no fish, but will eat those from the other side without harm; a portion of a reef south-east of Nouméa is avoided by fishermen; fish eaten with relish in the Solomon Islands are highly toxic in the northern New Hebrides.

In the toxic areas the red snapper

* Professor Banner is Director of the Hawaii Marine Laboratory.

Dr. Philip Helfrich, biologist, feeding a specimen of Ctenochaetus strigosus, a surgeon fish closely related to the toxic Maito (C. striatus) of Tahiti. This species, never toxic in Hawaii, is being fed over a period of months on the flesh of the toxic red snapper of Palmyra to see if it will develop toxicity.

Prof. A. H. Banner watching the feeding of a mongoose. The wild mongoose found in Hawaii has proved to be the most satisfactory animal available for initial screening of toxic fish. The mongoose, first starved for a day, is fed 10 per cent of its body weight of fish. If the fish is highly toxic, the mongoose will die in two days or less. If the fish is less toxic, the mongoose will be unable to walk or even stand.

is usually considered the worst of the fish, but the same symptoms may be produced by fish as diverse as the groupers (for example, *Serranus*), the barracuda (*Sphyraena*), the jack or trevally (*Caranx*), the moray eel (*Gymnothorax*), and even the little surgeon fish (*Ctenochaetus*).

Toxicity Pattern May Change

In any island group the pattern of toxicity may change over the years. The red snappers from Palmyra were imported by the ton to the Honolulu market previous to World War II.

More recently, the small "ulua" (jack or trevally, *Caranx cheilio*) that had been eaten by the U.S. Navy employees for years on Midway Island in the Hawaiian chain suddenly became toxic in October, 1959, and in two months, more than twenty-five individuals were poisoned.

Main Types Of Fish Poisoning

There are at least four distinct types of fish poisoning in the tropical Pacific, and probably several more.

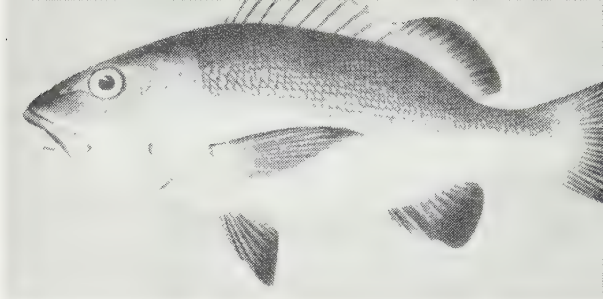
One is found in certain of the puffer fish (blowfish, toadfish—*Tetraodon* or *Arothron*). This poison has been studied by Japanese workers, who have isolated the toxin. It appears to be formed by the fish themselves, and the fish in all parts of its wide distribution are considered to be toxic unless great care is taken in preparing them for cooking.

Another type of toxicity is that found in the tuna and mackerel-like fish (Spanish mackerel, tuna or tunny, etc.). This also has been studied by the Japanese workers, and has been found to be the result of initial and minor decomposition by the bacterium *Proteus morganii* which occurs before the fish is "spoiled" in any obvious way.

The third type is that discussed in this article, the *ciguatera*-type of toxicity. Here the toxin is found in many types of unrelated fish in definite geographic regions; typically, it is not of seasonal occurrence, at least in the red snapper.

The fourth type of toxicity, almost unstudied, is an intoxication resulting from the eating of mullet (*Mugil*), surmullet (*Upeneus*) and related fish; it causes hallucinations and dizziness soon after eating if the person remains awake, or nightmares if the person falls asleep.

Other types of fish poisoning have been indicated, sometimes in medical papers, sometimes by cases reported only by the residents of the islands. These include poisoning by shark livers, by turtles, by certain sardines, by fish that are safe in most seasons but that are toxic when the balolo (or palolo) worms rise in Fiji and Samoa. There is even a crab that is reported to be toxic to eat.

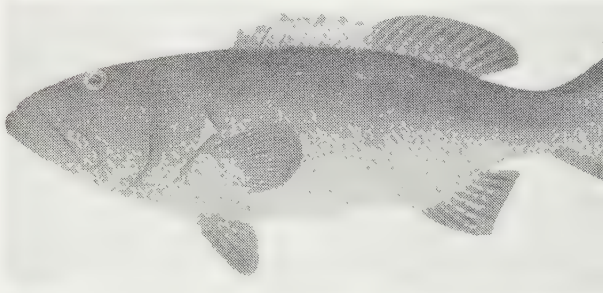


LUTJANUS BOHAR Forksal.

The red snapper, red emperor, l'anglais. This fish is probably the most consistently toxic fish in the tropical Pacific. In life it is a bluish hue above, and pink to red along the belly; however, soon after dying it turns brilliant red all over.

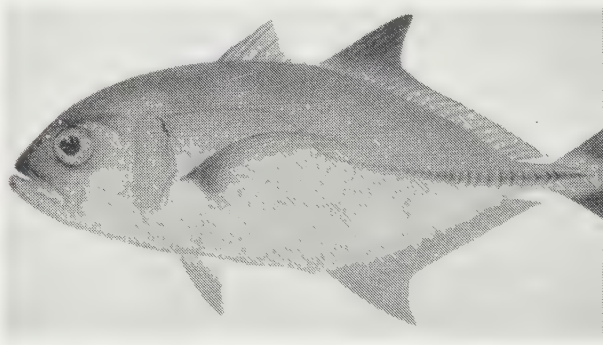
LUTJANUS MINIATUS (Shneider).

Scavenger fish, sweetlips. This is a silvery grey fish, and is often quite toxic in poisonous areas.



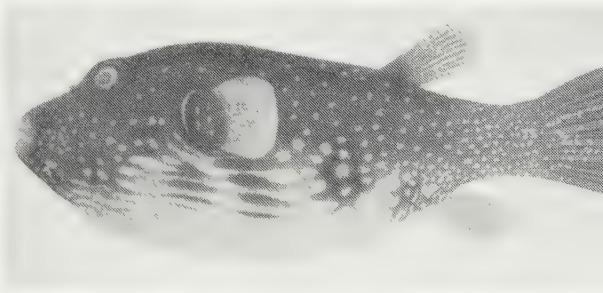
PLECTROPOMUS TRUNCATUS Fowler.

One of the groupers; this genus is known as Loche saumonee in New Caledonia. The fish is pink to red, with numerous blue spots. It is frequently violently toxic.



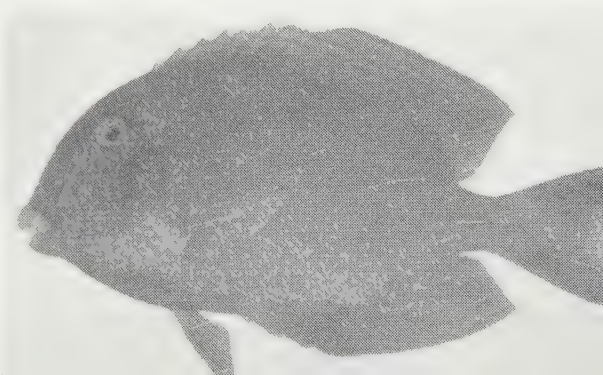
CARANX LESSONII Cuvier & Valenciennes.

One of the jacks, trevally or crevally. This fish, usually highly esteemed as food, becomes toxic in areas like Palmyra atoll, and a small related species caused an outbreak of fish poisoning at Midway Island. In Fijian waters, it is reported to be toxic only during the balolo season.



AROTHRODON HISPIDUS (Linnaeus): also known as TETRAODON HISPIDUS

One of the numerous puffers or toadfish which are characterized by their ability to inflate themselves into a balloon. These fish, in all parts of their range, are reputed to be highly toxic unless correctly prepared for cooking. Also related and also toxic is the balloon fish, with sharp spines, often known as porcupine fish (Diodon).



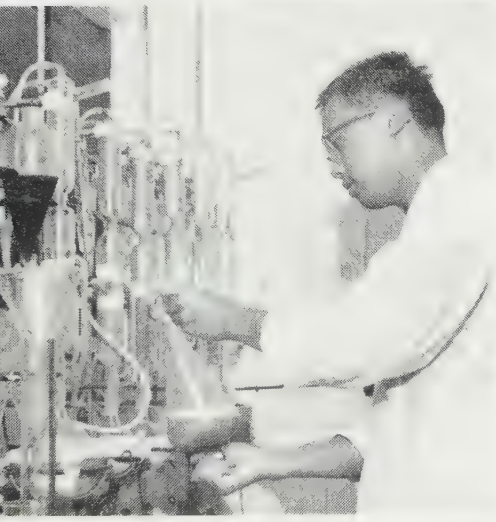
CTENOCHAETUS STRIGOSUS (Bennett).

A black surgeon fish with stripes—known in Tahiti as the Maito. This is an herbivorous fish that becomes highly toxic in certain areas, and is fed upon by the larger snappers and groupers; it may be important in the transmission of the toxin along the food chain.

Miss Angeline Silva, assistant in biology, grinding a dried sample of the toxic fish in preparation for extraction. In processing the fish for the removal of the toxin, the fish are cleaned and filleted immediately after capture, and stored near 0° F. until they can be used. Then the fish is ground, dried in hot-air draft ovens at about 200° F., and repulverized. Boiling alcohol is used for the primary extraction. (A respirator is used because the fine dust of toxic fish irritates the respiratory tract.)

Only the type of fish poisoning known as *ciguatera*—the one that is limited geographically—is currently being investigated at the Hawaii Marine Laboratory of the University of Hawaii. For over three years our group of biologists and chemists have studied the problem intensively.

As is true with all scientific research, we must proceed slowly but meticulously. We use scientific "controls"—in this case, by contrasting the action of toxic fish with nontoxic fish of the same species—



Mr. Clifford Chang, an assistant in chemistry, preparing the toxic extract for further studies. The dark material in the separatory funnel is the crude extract from the initial extraction with 95% alcohol, here being washed with petrol ether to remove the fats.

and we carefully time the reactions of test animals to measured dosages of the toxic fish. To avoid confusion with possibly variable types of toxins from other species of fish and from the same species from other areas, we have used almost exclusively the large red snapper mentioned in the opening paragraph, and

Mrs. Lee Batty, chemist, holding a vial which contains the still-impure extract from Lutjanus bohar. The dark material in the test tube represents the toxin from about 45 lb. (20 kg.) of flesh—these few drops would be enough to kill about a thousand mice.

those only from the Palmyra and Christmas Atolls in the Line Islands.

For initial determination of the toxicity of any fish, we feed it to the Indian mongoose (*Herpestes mungo*), a small carnivore that has been introduced to Hawaii. For more precise assay we inject a partially-purified extract of the fish into the body cavity of a white

Dr. Philip Helfrich, biologist, injecting an extract of poisonous fish into the body cavity of a white mouse. The standard laboratory mouse provides an accurate test for the extracted toxin, and will die within a few minutes if injected with a strong toxin. Each mouse is weighed and given an injection proportional to its size; usually for each test the toxin is injected into several mice at each of several dosage-levels. By averaging the time to death at each level, and comparing the results with other tests, an appraisal of the toxicity of the particular sample is obtained.

mouse. A toxic fish may kill a mongoose in twelve hours or a mouse in seven minutes.

Evaluation Of Popular Beliefs

One of the first tasks in our studies was to evaluate the many beliefs held popularly in the islands because, if they were true, they would have speeded our investigations.

Fishermen reported, for example, that the larger fish were toxic while the smaller fish of the same species were usually safe to eat. This we found to be true at Palmyra, where ninety-five per cent of the snappers weighing over ten pounds would cause coma or death in our mongooses and the other five per cent would cause marked symptoms, while only twenty per cent of those weighing less than two pounds would produce at most only slight symptoms.

Other beliefs, however, were not supported by scientific tests. We could find no changes in external appearance nor internal structure correlated with toxicity; no method of preparation reduced the toxicity, whether it was immediate cleaning and skinning — some fish were filleted while they were still flopping—or any technique of washing or cooking. We found the toxin was not altered by any normal heat, as in cooking, nor by cold, as in a refrigerator near 0° F. for eighteen months.

We also checked the belief that flies and ants are repelled by toxic fish, and that a toxic fish, when cooked with a silver coin, will discolour the coin. These beliefs were not true. Flies, for example, not only do not avoid the fish of proven toxicity, but can actually be raised upon the putrefying flesh of these fish. And an acid-cleaned American dime—we had no sixpence available—shows no difference whether it is cooked with a lethally toxic fish or with a perfectly safe control fish.

It is also contended that the head end of the fish is more toxic than the tail. At least for the muscles, this is not true. However, the viscera—the liver and the testes especially—may be up to fifty times as toxic as the muscles. While we have made no studies on the brain, it is likely that it may be more toxic than the muscles. Thus, if a person ate the nervous tissue of the head, he might receive more toxin than if he had eaten the muscles of the tail.

Main Work On Two Phases Of Problem

Our work to date has been primarily concerned with two phases of the problem: first, to isolate and to identify chemically the toxin, and, second, to determine why fish become toxic in only restricted areas.

The isolation of the toxin has been very difficult, the difficulty being caused at least in part by the extremely small

Messerschmidia argentea, also known as "false tobacco". This silvery leafed beach plant is widely used throughout the low islands of the Pacific as a cure for fish poisoning. Its effects have not been studied scientifically.

amounts of toxin found in the flesh of even lethally toxic fish. For from every ten-pound fish we start with, we can expect to recover less than 0.0003 lb. of the toxic extract; and even this extract is still not entirely pure. This toxin, even at its present level of impurity, is roughly comparable in potency to the venom of rattlesnakes. Like curare, the poison used by the Indians of the Amazon for their poison darts, this toxin appears to hit the vital pathways of the nervous system.

The method of extraction of the toxin has been reported in our scientific papers; here it will suffice to state that the lengthy process is carried on with a complex of various organic solvents, starting with boiling alcohol to extract the toxin and much else from dried flesh, and ending with selective flushing of the toxin from columns packed with specially-prepared absorbents.

At the time of writing a few crystals, presumably of the toxin, have been found in the most concentrated extract; yet the crystals are microscopically small, and float in a drop of oily residue. When sufficient amounts of the crystals are prepared, the chemical nature of the toxin will be investigated.

Many Theories For Regional Toxicity Pattern

Biologically, many theories have been offered as to the cause of the regional pattern of the toxicity. Some may be discarded on inspection. For example, the people who blame the toxicity on jettisoned war-surplus materials or on atomic fall-out do not remember that one of the first reports of fish poisoning of this type in the Pacific was made by Captain Cook from near Santo, New Hebrides, in 1774, or the German accounts of fish poisoning at Jaluit in the Marshalls in the last half of the nineteenth century. These somewhat predate the Bikini and Christmas Island bomb-testing. Similarly, the theory that the fish poisoning is caused by "coral in flower" can be discarded because coral, an animal, does not flower. In the Caribbean, the origin of the toxin is laid to the fruit of the manchineel tree (*Hippomane mancinella*), but this does not normally grow in the Pacific; further, it is difficult to imagine how—or why—a large carnivorous fish from the outer side of a barrier reef could, or would, feed on its apple-like fruit.

The theory that the toxin comes from the plankton—the microscopic drifting life of the sea—has a little more to support it, for the toxicity of shellfish in the North Pacific has been definitely traced to a microscopic plant that may be so abundant as to stain the water red. Yet none of the fish that show the *ciguatera* toxin are fish that feed directly or indirectly on the plankton, except incidentally. The herbivorous fish, like surgeon fish, feed primarily on the bottom plants or algae; the carnivorous fish feed upon the bottom-feeding fish like the surgeon fish. On the other hand, the fish that feed exclusively on plankton-feeding fish, like the tunas and the dolphin (MAHIMAHI in parts of Polynesia—*Coryphaena*) never show this type of toxicity.

Our hypothesis, yet unproven, is that the toxicity arises in some of the fine algae growing on the bottom. This algae is then eaten by various herbivorous fish like MAITO, the toxic surgeon fish of Tahiti (*Ctenochaetus strigosus*) which are not poisoned by the toxin, but instead accumulate it in their tissues. These small fish are in turn eaten by the larger carnivorous fish like our snapper, which also store the toxin. We have found that the snapper does indeed feed on the toxic surgeon fish, but we have not yet traced the toxin to an alga.

Wider Research Planned

In the coming years we hope to continue our present lines of research, and to expand them into other phases of the problem. One thing we hope to do is to investigate other species of fish and reef animals reported as toxic to see if they have the same toxin as that found in the red snapper from Palmyra Atoll.

Another extension of our work is the investigation of the reaction of the body to the purified toxin. As this is written during the summer of 1961, a member of our staff is working with a pharmacologist of the School of Medicine of the University of Southern California to determine the exact mode of action of the toxin upon the nervous system. From this we hope to develop a more sensitive and precise test for the toxin, and to obtain information so that the doctors may treat fish poisoning with drugs specific to it.

From our chemical studies we hope to be able to develop an accurate chemical test for toxic fish that may even be simple enough to be used by medical practitioners and nurses in isolated island communities.

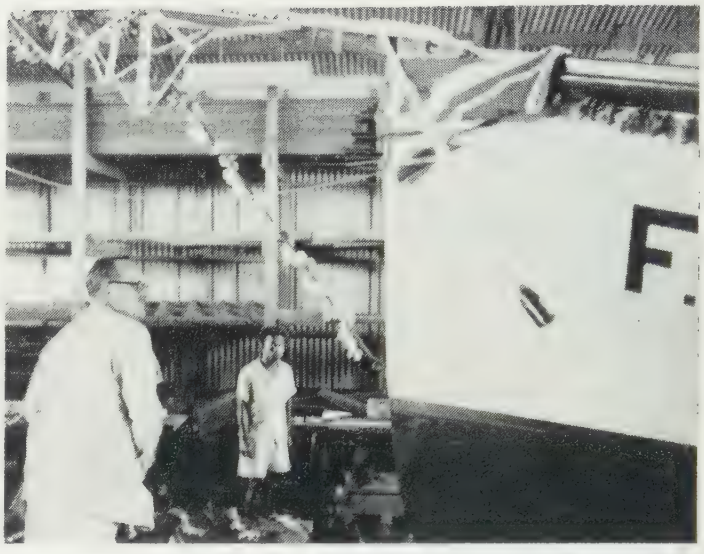
Investigation Of Native Remedies

We also plan to extend our studies into an investigation of the native remedies developed by the island people during the thousands of years they have been treating this fish poisoning. These "home remedies" vary from island to island. Some, like the combination of coconut cream and lard, are emetics; others, like the juice from the Manila tamarind (*Pithecolobium dulce*), are purges. The obvious effects of these are to rid the digestive system of the poisonous fish before greater harm is done. Yet other plants, widely used for fish poisoning, like "false tobacco" (*Messerschmidia argentea*) or a salpiglossid (*Duboisia myoporides*), may contain drugs that are actually specific in their counteraction against the toxin. Native herb medicines should never be belittled without careful investigation—after all, it was the Inca Indians who discovered quinine as a specific against malaria.

Pacific Survey Planned

One of the major extensions of our studies will be a survey of fish poisoning in the Pacific. This will be done to provide us with clues as to the origin of the toxin, and to permit us and the health authorities to assess fish poisoning as a threat to public health. The study will be made in co-operation with the National Institutes of Health of the

(Continued on page 65)



Above: His Excellency the High Commissioner for the Western Pacific, Mr. D. C. C. Trench, C.M.G., M.C., addresses the gathering before performing the launching ceremony (right).

Fishing Cutter Launched At SPC Boatbuilding School

A 25′ fishing cutter built by the trainees of the SPC-FAO Boatbuilding School at Auki, in the British Solomon Islands, was launched on July 13. An account of the launching ceremony appears below.

By E. P. W. MARRIOTT*

A LARGE crowd of interested spectators gathered at the SPC Boat-Building School at Auki, Malaita, in the British Solomon Islands, on Thursday, July 13. The occasion was the launching of the first of three 25′ fishing boats built by the trainees under the direction of Mr. C. R. Fisher.

His Excellency the High Commissioner for the Western Pacific, Mr. D. C. C. Trench, C.M.G., M.C., performed the launching ceremony, and the boat took to the water under the designation "F1".

The ceremony began at 5 p.m., the estimated time of full tide in Auki Harbour. Ships in the harbour were dressed, and the boatbuilding shed was decorated with flowers and palm fronds. "F1" lay on her blocks on the slipway, lined on both sides by the twenty-four trainees.

In welcoming the High Commissioner, the District Commissioner of Malaita, Mr. M. M. Townsend, M.C., spoke of the transformation of that part of the foreshore of Auki in the preceding twelve months, and of the great interest that had been aroused by the competent work of the boat-building trainees. He congratulated the Director of the Course on the successful completion of each stage of the work according to plan, and praised the team spirit of the trainees, who had come from six different Pacific territories.

Example Of International Co-operation

His Excellency the High Commissioner, Mr. D. C. C. Trench, expressed his special appreciation of two aspects of the Boatbuilding Course—as a working example of the industrial training so vitally needed in the Pacific, and as a most successful exercise in international co-operation. The South Pacific Commission, the United Nations Technical Assistance Board, and the United Kingdom and British Solomon Islands Protectorate Governments had all played their parts in the organisation and costs of the Course, while in similar manner the trainees—from Papua and New Guinea, Netherlands New Guinea, the American Trust Territory, New Hebrides,

* Mr. Marriott, who is Editorial/Administrative Officer in charge of the SPC Literature Production Training Centre at Honiara, was a guest at the launching ceremony.

Before the launching ceremony, trainees were presented to His Excellency by the Director of the Course, Mr. Cecil Fisher.

Above: Watched by crowds lining the foreshores, trainees guide "F 1" into the water. Right: Floating high after her launching, "F 1" will be down to her marks after engine, mast, rigging and gear have been installed.

Gilbert and Ellice Islands and British Solomon Islands—had worked happily together.

"It is singularly appropriate," Mr. Trench continued, "that the first vessels to be produced by the Course are fishing boats. The Course itself is providing training for one industry, and the boats are destined to provide training for yet another—the fishing industry. Initially all three boats will be taken over by the Government and used for an intensive fisheries training course for Pacific students organized by the South Pacific Commission, with the assistance of both the Food and Agricultural Organization of the United Nations and the Protectorate Government—yet another example of the value of co-operation. Once this Course is completed, one boat will be used for training and exploratory work by the Fisheries Officer attached to the Protectorate's Agricultural Department. The remaining two will be sold to enterprises interested in stimulating the local fishing industry.

"The launching of the first of these three boats, then, marks the approach of the end of the first of the school's exercises. The next exercise will start in the near future, and will involve the construction of four 25′ touring vessels. Their design is more complex than that of the fishing boats which we see here today, but I am quite satisfied that the Course will turn out an even better result.

"Lastly, I would like to say that I am sure that the spirit and success of the Course owes a very great deal to Mr. Fisher, whose abilities as a boatbuilder, a boat designer, an organizer, a practical instructor and a guide to his students, must be apparent to everybody who has seen the Course in action. I would like on behalf of the Protectorate Government to thank and congratulate him very sincerely for all he has done for this Course, and to conclude also by congratulating the students very warmly on their good work. You must all feel very proud to see these fine ships, and to know that you have made them yourselves. Well done, all of you", concluded His Excellency.

Mr. Fisher, mindful of the falling tide, then spoke briefly: "We are indeed grateful, Sir, for your presence here this afternoon; for after all, one toils on day after day creating and wondering just what is going to be the ultimate result.

"Before you, behind you and ahead, lie the products of ten months' work. This to the builder is a great day, as he sees his creation slide down the ways and become a ship or a boat."

Traditional Launching

The ship was then ready for launching, and the High Commissioner took his position on the dais with the traditional bottle of champagne. The trainees, lining both sides of the slipway, quickly knocked the blocks away and jacked the bow up a little. "F1" began her slide down the well-greased slips, and His Excellency broke the bottle of champagne against her bows. She gathered speed and, keeping straight on the slips, entered the water cleanly, to the applause of the crowds lining the foreshores.

Annual Review Of Commission's Work

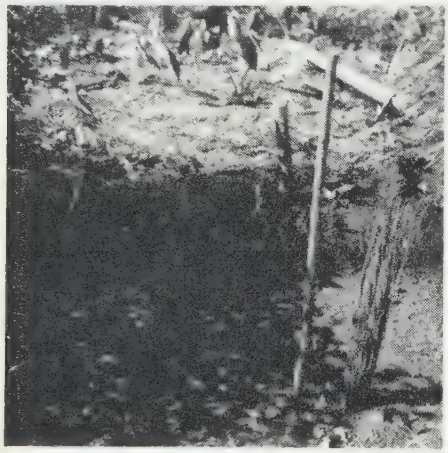
PROGRESS made during the past year by the South Pacific Commission in its three main fields of work—economic development, health, and social development—will be reviewed at the Commission's twenty-second session, which will open at its headquarters in Nouméa on October 12. The meeting is expected to last about twelve days.

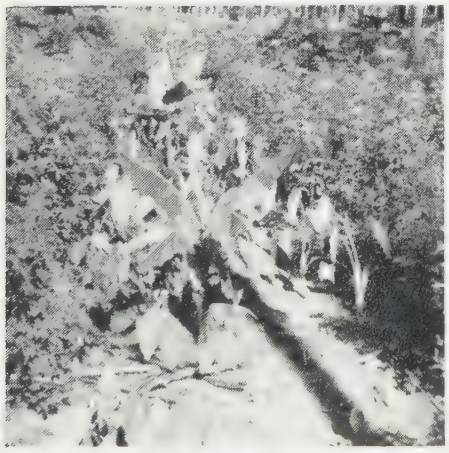
Representatives will attend from the six member nations—Australia, France, the Netherlands, New Zealand, the United Kingdom and the United States of America. Chairman for the session will be the Senior Commissioner for France, M. Henri Nettre.

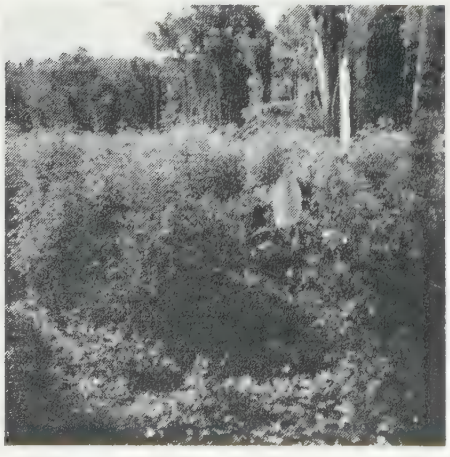
The main topic for discussion will be the Commission's activities throughout the Pacific in a wide variety of fields. They include the three training schools—in literature production, boat building, and fisheries—now running in the British Solomon Islands, the just-concluded women's interests seminar in Western Samoa, and health education training courses held in various territories throughout the year. As well, the work of specialist officers in the fields of public health, co-operatives, women's interests, rhinoceros beetle control, and plant introduction will be reviewed.

The Commission will also study, and decide action on, recommendations it has received from meetings held under its auspices earlier in the year. These include the South Pacific Games meeting in March, second technical meeting on co-operatives in April, health education conference in May, youth study group in June, symposium on tropical crops in August, and urbanization advisory committee meeting in September.

The Commission will also review plans being finalized for the holding of the fifth South Pacific Conference in Pago Pago, American Samoa, in July of next year. (The Conference is a regional meeting of Pacific Island peoples, convened by the Commission every three years.)







Top to bottom: 1—Laying out a plantation after clearing the land. 2—Bundle of rooted cuttings of Leucaena glauca, ready for planting. 3—Subsistence crops such as bananas, taro, sweet potatoes, etc., are planted in an east-west direction. 4—Cocoa seedling between two rows of Crotalaria anagyroides, with sweet potatoes in foreground.

Papuans Grow Cocoa In Netherlands New Guinea

Under the guidance of Agricultural Extension Officers, Papuans in Netherlands New Guinea are clearing rain forest and alang-alang grass areas, and planting cocoa.

By JAN COENEN*

IN Netherlands New Guinea, Papuans, working under the supervision of the Department of Agriculture's extension and information service, are establishing cocoa plantations in many parts of the territory.

The main difficulty that extension workers have encountered is that of persuading a primitive people to employ improved methods of soil preparation and crop cultivation. For centuries, native agriculture has been based on a bush-fallowing rotation, land being used to grow crops for about one year in ten.

Several methods have been worked out to promote the adoption of more permanent forms of agriculture. One is to train Papuans at several of the Department's agricultural stations in how to establish and maintain a cocoa plantation. Then the more-or-less skilled Papuan cocoa farmers return to their villages and direct their people's efforts.

Each village consists of a limited number of small families, each with its own smallholding on which annual and perennial crops are grown. To establish and maintain a cocoa plantation, co-operative work by several villages is needed. This is not always easy because of existing rules of land tenure. However, under the tactful guidance of extension service workers and district officers, several areas are now being prepared co-operatively for the planting of cocoa.

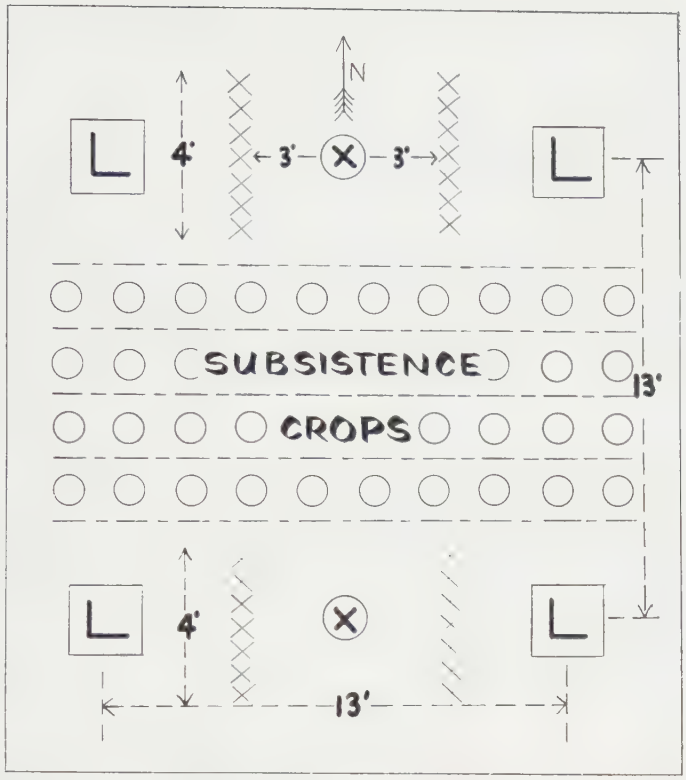
Preparing A Planting Area

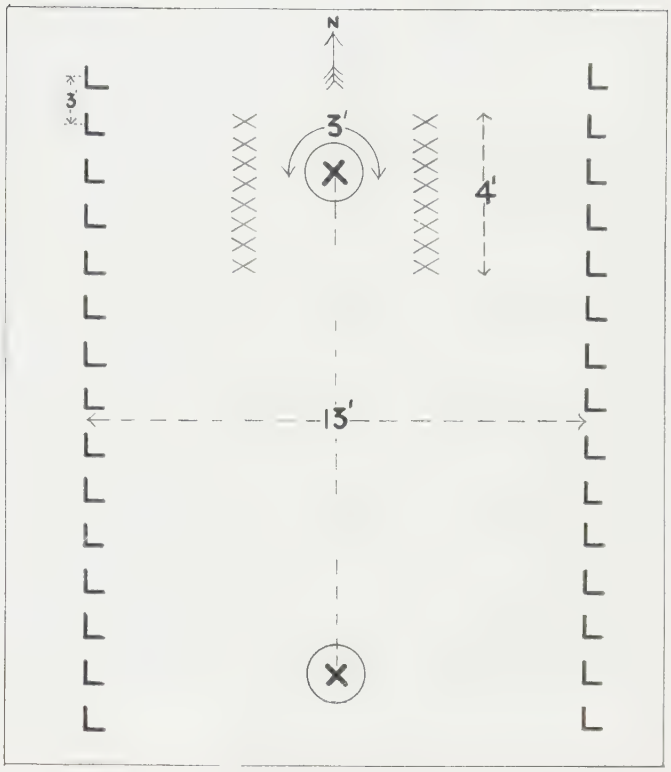
The selected areas are usually either covered with rain forest or alang-alang grass (*Imperata cylindrica*). The procedure for establishing a cocoa plantation on each will be described in turn:

RAIN FOREST AREA: The area is cleared by cutting down small trees and shrubs with a machete, gathering and drying them in rows, and then burning them. Next, large trees are cut down with an axe and the trunks either burned or removed from the area.

* Plant Introduction Officer, South Pacific Commission

Below: Papuan woman with pods of Keravat cocoa (Trinitario) harvested from their own trees. The seeds will be used for the new plantation. Right: Cocoa nursery, showing seedlings ready for transplanting.





Layout for cocoa plantation to be established on land cleared of rain forest (Fig. 1 above), and on land cleared of alang-alang grass (Fig. 2 right).

Immediately clearing is completed, rooted cuttings of *Leucaena glauca* are planted at the corners of 13′ squares. Planting holes for cocoa seedlings are dug from north to south between the *Leucaena glauca* cuttings (see Fig. 1). Also, in an east-west direction between the latter, subsistence crops are planted temporarily until the cocoa comes into bearing.

Near the cleared area a cocoa nursery is established in a shady place where water is available, the cocoa seeds being provided either by the agricultural extension service or neighbouring villages. Before the seedlings are transplanted from the nursery to the field, temporary shade for the young cocoa seedlings is established until permanent shade is available from the *Leucaena glauca* trees. For this purpose *Crotalaria anagyroides* is sown thinly in single furrows about 4′ long in a north-south direction, in the middle between the *Leucaena glauca* cuttings and the holes for the cocoa seedlings.

Six months later, when the cocoa seedlings are about 12″ to 15″ high, they are, after one month's hardening, transferred from the nursery to the planting holes prepared for them.

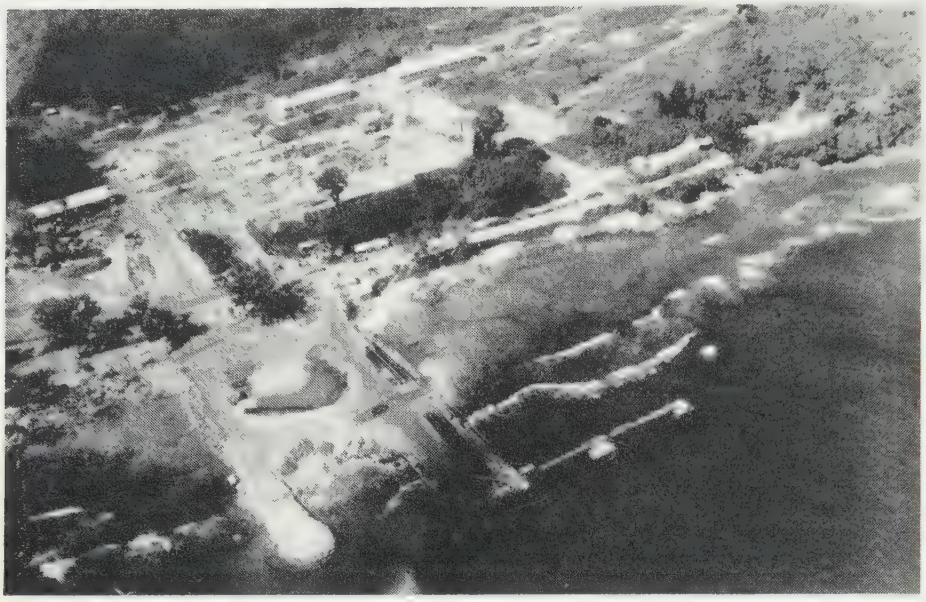
ALANG-ALANG GRASS AREA: Large areas covered with this kind of grass are found around Lake Sentani, near Hollandia. For centuries they have been used only for fire-hunting, but now some are being prepared for the cultivation of cocoa by Papuans working under the supervision of extension officers.

The area to be planted is first laid out with rows of stick markers 13′ apart. The next step is to clear the area by cutting the grass in a strip along the rows of markers. On these cleared strips, rooted cuttings of *Leucaena glauca* supplied by extension officers are planted

(Continued on page 41)

Below: Laying out a cocoa plantation on an alang-alang grass area. Centre: The grass has been cleared on either side of the line of Leucaena glauca cuttings. Right: In the centre of this cleared strip, holes for planting the cocoa seedlings will be dug at intervals of 13′.

Manganese Mine Opened In New Hebrides



An event of some importance to the economy of the New Hebrides took place last July, when the new manganese mine at Forari, on Efate Island, began production.

By RAYMOND ROBINEL*

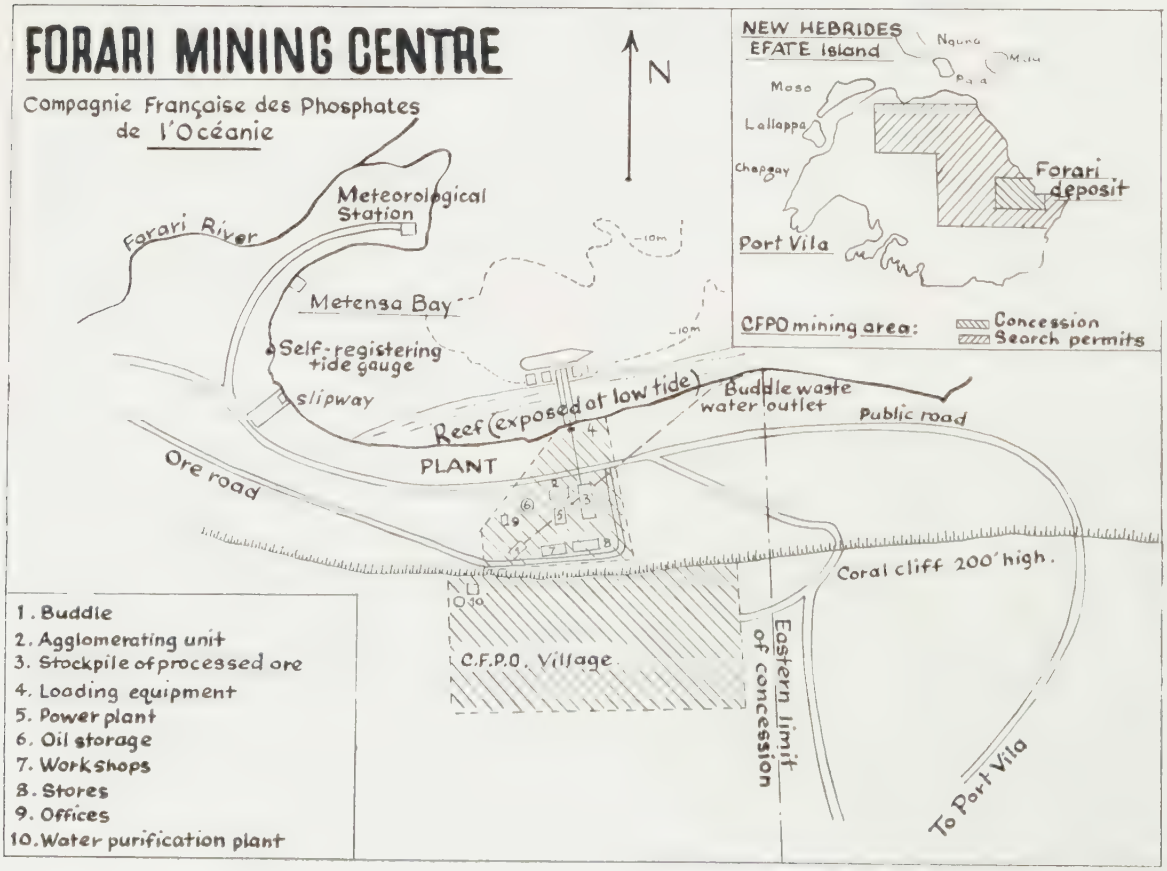
IN the New Hebrides, prospecting for minerals began as soon as Europeans settled there. Volcanic sulphur deposits on Vanua Lava in the Banks Islands were being worked when the first large plantations were being established. Apart from this activity, which was limited both in time and scope, interest soon subsided, and was revived only after World War II, when many people were granted prospecting permits covering nearly three-quarters of the country.

At present, while prospecting is continuing in many areas, we are witnessing the final stages of the setting up of a French Company, *La Compagnie Française des Phosphates de l'Océanie* (C.F.P.O.), to work the manganese deposits at Forari on Efate Island. This project is nearing completion, and it is appropriate to recall the preparatory work carried out during the last seven years by the Company's agents and to describe the mining, social and industrial aspects of this new asset to the Hebridean economy.

Manganese Deposits Found In 1955

In October, 1954, a C.F.P.O. mission arrived in the New Hebrides to carry out a general geological survey of the Group with a view to checking some observations made by scientific missions

* Information Officer, French Residency, New Hebrides.

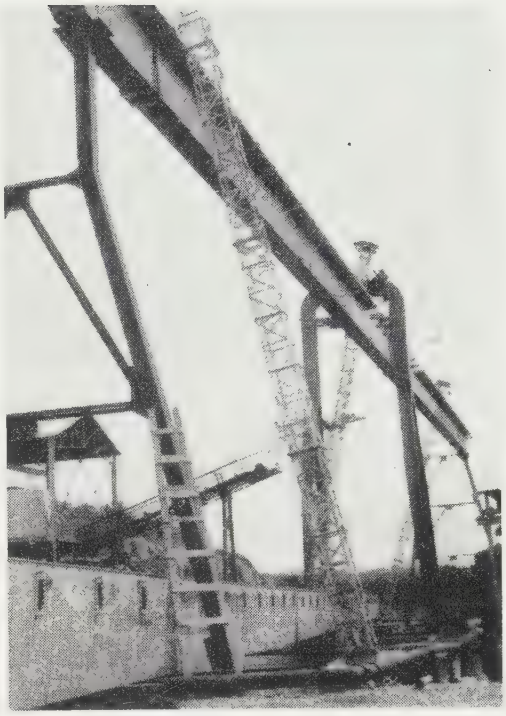


Above: An aerial view of the Forari installations, which include the ore-processing plant and jetty.

Left: Plan of the Forari installations. Inset map shows location of Forari concession on Efate Island.

Opposite: The jetty is flanked on each side by two mooring dolphins, joined to it by a steel girdered passageway.

Foundations for the jetty being installed.



The mixture of crushed ore and clay is transported by conveyor belt and shute for washing in this buddle, or shallow inclined vat.

between the two World Wars. A few months later—in June, 1955—outcrops of manganese ore were discovered on the east side of Efate immediately north of Metensa Bay, on a plateau 300′ to 600′ high, on which the village of Forari stands. After this discovery, systematic prospecting was carried out by the *Compagnie Générale Geophysique* at the request of the C.F.P.O. to determine the extent of the deposits.

Samples of the ore were sent to Paris, London, and Denver (U.S.A.) to be analyzed. Experiments, particularly those carried out by *Minerals et Métaux* and the *Institut de Recherche de la Sidérurgie* led to the discovery of a simple process for enriching the ore.

While these lengthy investigations were being carried out, the Condominium Administration, anxious to encourage the growing enthusiasm shown by C.F.P.O., was attempting to give the New Hebridean mining industry a legal basis. A joint Ordinance was published in 1957. It states that the ownership of deposits rests with the Condominium, and that the Resident Commissioners are empowered, at their own discretion, to grant search permits. These are valid for two years, may be renewed twice, and are granted on a "first come first served" basis. When proof is given of the existence of a deposit, the claimant may be granted a 25-year mining concession.

The Forari Deposits

By the end of 1958, borings which had revealed the extent of the deposits permitted an evaluation of reserves, and indicated the best methods of extraction.

The Forari deposits comprise a horizontal layer of psilomelane, or impure manganese hydrated oxide, spread over an area of some 670 acres. In some places it is 5′ to 6′ thick, the average being 2′. The structure of the ore is somewhat cavernous, since concretions are sometimes found among tuff, limestone and clay.

Taking into account the general lay-out, it is considered that the reserves are at present of the order of three million tons of ungraded ore, with a 30% manganese content. Since the steel industry requires "metallurgical ore" with a 46 to 48% content, this ore must necessarily be enriched. Reserves therefore can be estimated at 1,200,000 tons of commercial ore.

The mining is opencast, and land clearance started in May last. At that time, the road connecting the deposits and plant was made. The ore is being dug out by means of caterpillar shovel dredges. It is anticipated that the daily output will be of the order of 800 to 1,000 tons of rough ore, which will be conveyed to the plant by five 20-ton lorries. The return journey, including loading and unloading, takes approximately one hour.

Processing The Ore

In the preliminary stages, the possibility of producing a "chemical ore" with a manganese oxide content of over 80%, intended for chemical industries,

was investigated, but this project was dropped. The composition of the ore is such that it is possible to use a purely physical processing, which is obviously easier. By mechanical means only, sluicing and sieving the raw ore, concentrating and agglomerating the fines to obtain an improved sieve test, it is possible to produce a commercial ore with a manganese content exceeding 50% and a fines content of less than 5%. The requirements of the steel industry are, therefore, easily met.

The building of the processing plant and shipping installations begun fifteen months ago is almost finished. The plant is well supplied with fresh water from the Forari River, which runs nearby along the southern boundary of the deposit and flows into Metensa Bay.

The processing plant includes a hopper to which the ore is conveyed by truck from the deposits two miles away. From the hopper, the ore goes by conveyor to a crushing cylinder which breaks it down to lumps of around 2" diameter. These are subsequently dumped into vats where they are steeped in water for approximately eight hours. This starts the process of separating the clay, which swells in water.

The ore then goes to a buddle, where it is sluiced under running water in a trommel, or large cylinder, and is later conveyed to a set of vibrating screens. It is estimated that approximately one and a half tons of ore and clay mixture produces, after sluicing, one ton of ore. This is sent to the agglomerating unit, where the manganese content is increased to over 50%. Finally, the commercial ore is conveyed by tipping buckets to a stock piling unit with a capacity of 18,000 tons.

The Forari processing plant has many ancillary installations. The main ones are a power plant consisting of six diesel generators with a total output of 1,500 k.v.a.; workshops for mechanical and electrical maintenance; a pumping station located on the Forari River where two pumps with a 7,000 cu. ft. per hour discharge supply a 70,000 cu. ft. tank.

Above: The power house. Right: One of the five twenty-ton trucks that will carry up to one thousand tons of ore daily from mine to plant.

Port Facilities

The ore will be shipped from the new port established in Metensa Bay. It was found necessary, from the very beginning and for many reasons, to build a wharf at Forari. Large quantities of heavy material had to be landed as near as possible to the building site. Since there is no wharf at Vila, the capital of the island, it was not possible to consider lighterage for loading and unloading, which in any case would have been very costly.

For these reasons the C.F.P.O. decided to use Metensa Bay, which is suitable for a port, since there is a border reef located about 150' below high water mark which can be used as a foundation. Its outside edge falls sheer into the sea to a depth of 30'-35'. The *Compagnie Industrielle des Travaux* —the contractor for harbour facilities— has built a 500' jetty whose foundations rest in a depth of approximately 30'. It is flanked by four dolphins connected by footbridges. An approach channel is being dredged and will be marked by buoys, so that the port will be able to handle cargo ships of up to 10,000 tons. Manoeuvring will be assisted by two Hansa tugs. Each is fitted with a Voitle Schneider outboard motor with controllable pitch which enables the tug to swing in any direction, and even turn in its own length. There will also be two large launches for harbour duties.

Normally, Metensa Bay is perfectly usable in spite of being exposed to the north-east winds. The tanker PACIFIC ENTERPRISE has already unloaded fuel there, despite the fact that port facilities are not completed. However, there might be difficulties during a heavy north or north-east swell.

The loading equipment, built by Seibert of Sarrebruck, consists of a gantry frame with a capacity of 600 tons per hour. The height of the gantry is automatically adjusted according to the quantity of material to be loaded and to the height of the tide, so that the ore does not fall too heavily into the ship's hold.

Market Prospects Good

It is anticipated that approximately 60,000 tons of commercial ore will be exported every year, mainly to Japan; commercial firms there have been on business term with the C.F.P.O. for the last 50 years. However, other buyers including the United States may be interested. World demand for manganese, needed in the manufacture of steel, is increasing every year by approximately 3% in western countries, equivalent to an extra 120,000 tons a year.

It appears, therefore, that prospects in the world market are good, nor are there any major problems locally. Technically, everything is progressing according to plan.

Local Labour Used

In the social field, a long-term programme is already being implemented.

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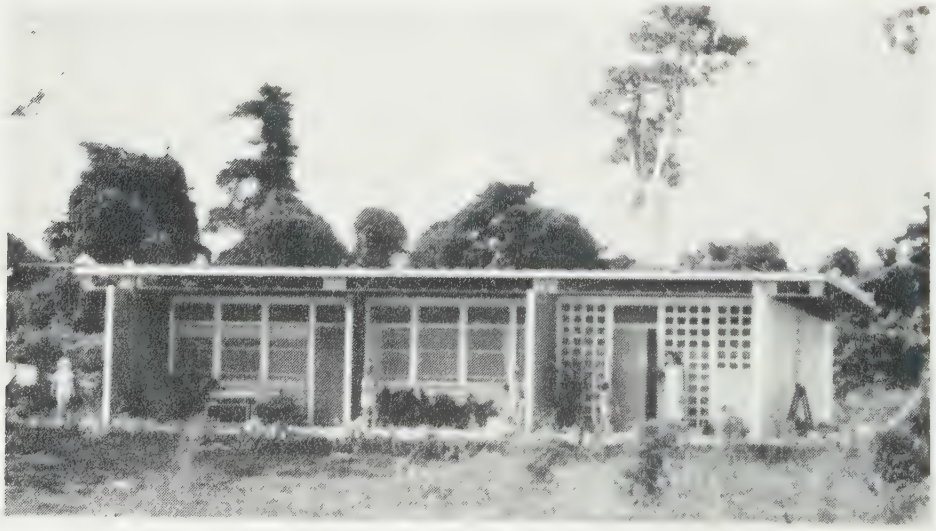
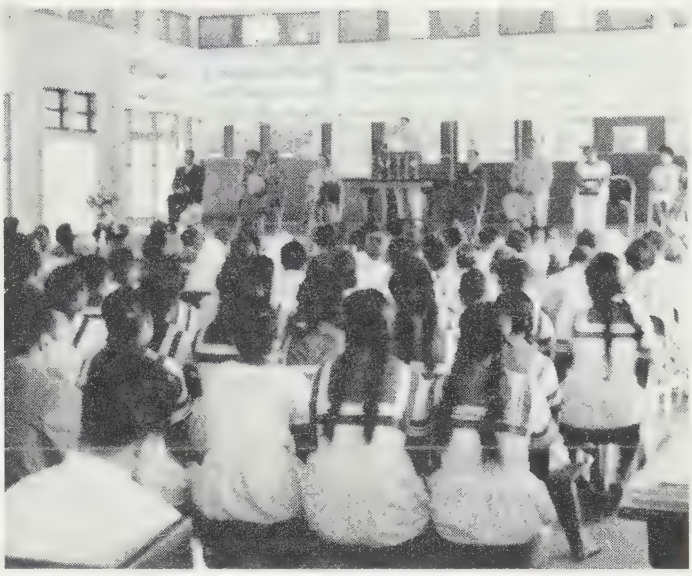


One of the cottages built for the staff.

His Excellency the High Commissioner, Mr. J. B. Wright, addressing the gathering at the formal opening.



Women's Interests Seminar Held In Western Samoa

Ways of developing community interests and activities among Pacific women were studied by forty-four participants from fifteen South Pacific territories who attended a women's interests training seminar held in Western Samoa from August 29 to September 21.

THE Seminar, which was held at the Samoan Church Committee's School for Girls at Papauta, near Apia, was organized by the South Pacific Commission with the support of the Food and Agricultural Organization, United Nations Educational, Scientific and Cultural Organization, and United Church Women of America.

The general aim of the Seminar was to offer a series of training courses in community education and group leadership, based on a study of the relevant conditions in the area with particular reference to the work of women's organizations, committees and clubs. Territorial participants were drawn from among those actively concerned with women's interests activities in the various territories, and included both voluntary and government personnel.*

Formal Opening

The Seminar was formally opened on August 29 by His Excellency the High Commissioner, Mr. J. B. Wright, at a ceremony which was attended by the Council of State and the Prime Minister of Western Samoa, the Hon. Mata'afa Fiame F.M. II.

Before inviting His Excellency to speak, the Commission's Executive Officer for Social Development, Dr. Richard Seddon, acknowledged with gratitude the generous assistance that had been received in support of the Seminar from the Government of Western Samoa and the Samoan Church Committee of the London Missionary Society, as well as from the Food and Agricultural Organization, the United Nations Educational, Scientific and Cultural Organization, and the United Church Women of America. Dr. Seddon then invited the High Commissioner to open the Seminar.

In his introductory remarks Mr. Wright welcomed the participants and the many distinguished personages from other parts of the world who were attending the Seminar.

Speaking of the origin of the South Pacific Commission's women's interests

* A full list of participants appears on the next page.

Below: Some of the participants and their guests at morning tea, following the opening. Right: Mrs. Fetaui Mata'afa (centre), wife of the Prime Minister of Western Samoa, with Mrs. D. Hussein, one of the delegates from Fiji.

project, Mr. Wright said that the Commission had decided in 1958 to appoint a women's interests officer to assist South Pacific territories in their schemes for the promotion of the interests of women, and to examine ways in which women might be helped to have a fuller understanding of their opportunities for service in the community.

Mr. Wright later spoke of the work that the Commission is doing. "This is a good example of the kind of field in which the South Pacific Commission can be most useful," he said. "No one territorial government could have brought together all the people from many lands who are gathered here today. Only the South Pacific Commission, as our own regional body, would have been able to enlist the support of the Food and Agriculture Organization, and UNESCO, and to arrange for the attendance at a regional Seminar of such renowned persons as Miss Gwilliam, the Women's Educational Adviser to the United Kingdom Colonial Office, Dr. Keister, the FAO home economist, and

LIST OF ATTENDANCES

AMERICAN SAMOA

Mrs. Situana'i Fuimaono, Women's Health Committee.

Mrs. L. Johnson, Women's Welfare Committee.

Mrs. Mary Hunkin, Women's Health Committee.

Mrs. Toeliu Maulupe, Public Health Nursing Office.

BRITISH SOLOMON ISLANDS

Miss M. Pelham-Johnson, O.B.E., Woman Education Officer.

Miss Florence Tinoni, Primary School Teacher.

COOK ISLANDS

Mrs. Maria Henderson, Youth Club President and President of the Federation of Women's Institutes.

Miss Mary A. Hopkirk, Women's Interests Officer.

Miss Naomi Iro, School Teacher, Girl Guide Leader and Chairman of Titikaveka Youth Centre.

Miss W. J. Smith, Homecraft Instructress.

FIJI

Mrs. Lusiana Daucakacaka, Assistant Women's Interests Officer.

Mrs. Mereula Guivalu, Delegate of the Fiji Branch, Pan-Pacific and South East Asia Women's Association.

Mrs. D. Hussein, Delegate of the Fiji Branch, Pan-Pacific and South East Asia Women's Association.

Miss Ruth Robertson, Women's Interests Officer.

FRENCH POLYNESIA

Mme. Moea Girard-Goupil, Advocate.

GILBERT AND ELLICE ISLANDS

Mrs. Catherine Essie Tekanene.

NAURU

Mrs. Eleanor Harris, Captain in the Girls' Life Brigade.

Miss Sunshine Keke, Trained Teacher, Primary, Sacred Heart Mission School.

Mrs. Agnes Waqa, President, Boe Protestant Women's Club.

NETHERLANDS NEW GUINEA

Miss G. M. de Haas, Nutritionist/Dietician, Health Department.

Miss Wilhelmina A. ten Kate, Youth Adviser of the Evangelical Christian Church.

Miss E. M. Lekransy, Leader of an Autochthonous Women's Club.

NEW CALEDONIA

Mlle. Jacqueline Pittet, Welfare Worker and Teacher at the Lifou Protestant School.

Mlle. Marie Philomene Tindao, Diocesan President of the Rural Young Women's Christian Association of New Caledonia.

NEW HEBRIDES (Joint Administration)

Sister Marie Blandine, New Hebridean Auxiliary in the Catholic Mission, Santo.

Sister Marie Meriadec, Teacher, Montmartre Girls' School, Catholic Mission, Vila.

Miss M. Cranstoun, of the Presbyterian Mission, Malekula.

Mrs. Leikarie, incoming President of the Presbyterian Women's Union, Lamen, Epi.

NIUE

Mrs. Mokafoou Kalia, of Lakepa.

Mrs. Maheletagaloa Siakimotu, of Avatele.

PAPUA AND NEW GUINEA

Miss M. English, Social Welfare Assistant, Department of Native Affairs, Central District, Papua.

Miss P. S. Rossell, Welfare Officer, Department of Native Affairs, Sepik District.

Mrs. Gima Kalo, President, Kaugere Women's Club and part-time broadcasting for the Women's Session, A.B.C.

Miss Nahu Vagi, Infant Welfare Assistant, Papua and New Guinea Administration.

TONGA

Mrs. Aunofo Koloamatangi, Member of Langa Fonua.

Mrs. Ala Luani, Member of Langa Fonua and Pan-Pacific and South East Asia Women's Association.

Miss Mele Liu Tongilava, Queen Salote College, and Member of Langa Fonua and Pan-Pacific and South East Asia Women's Association.

TRUST TERRITORY OF THE PACIFIC ISLANDS

Mrs. Mary Lanwi, Delegate from Marshall Islands to the Pan-Pacific and South East Asia Women's Association.

Mrs. Rose Makwelung, Adult Education Supervisor.

Mrs. Anastasia Ramarui.

Miss M. King.

WESTERN SAMOA

Miss Louisa Crawley, School Teacher.

Miss Momoi Kuresa, Staff Nurse and District Nurse Supervisor.

Mrs. Louisa Tanuvasa, Representative, Women's Committee.

Mrs. Osooso To'alepaiali'i, Representative, Women's Committee.

Staff and Consultants

Miss Marjorie E. T. Stewart, SPC Women's Interests Officer.

Miss Freda H. Gwilliam, O.B.E., J.P., Woman Educational Adviser, Department of Technical Co-operation, London.

Dr. Mary E. Keister, Home Economics Officer, F.A.O., Rome.

Miss Nicole Friderich, Department of Education, UNESCO, Paris.

Miss F. L. Charlton, Principal, Adi Cakobau School, Suva, Fiji.

Mr. E. Macu Salato, A.M.O., Medical Department, Suva, Fiji.

Mr. R. H. Boyan, SPC Co-operatives Officer.

Dr. Richard Seddon, SPC Executive Officer for Social Development.

Observers

Mrs. N. Schroder, Associated Country Women of the World, Area Vice-President, New Zealand.

Miss Christiana M. Clapham, Fiji Branch, British Red Cross Society.

Miss Bernice Montgomery, U.S. Department of State "International Co-operation Administration."

Mrs. Lili Malietoa, Pan-Pacific and South East Asia Women's Association.

Mrs. Arieta Mulitauaopele, Chief Public Health Nurse, American Samoa.

Miss F. L. Charlton, World Y.W.C.A.

Miss Ruth Robertson, World Y.W.C.A.

Mrs. Fa'alagi Faolotoi, Western Samoa.

Mrs. Leiavea Patu, Western Samoa.

Mrs. Aiulu Papali'i, Western Samoa.

Mrs. Taimane Seumanutafa Pogai, Western Samoa.

Above: Participants examine one of the craft displays arranged by the various territories represented at the Seminar. Right: Miss Sulamasina Malietoa (centre), of the Papauta Girls' School staff, discussing some craft work with (on her right) Mrs. L. Daucakacaka and Mrs. D. Hussein, two of the delegates from Fiji.

Miss Friderich of UNESCO's Department of Education."

Addressing the delegates, Mr. Wright reminded them that the success of the Seminar depended on the extent to which they would participate in its deliberations. He also reminded them that they were all experts from their homelands, with something to contribute to the meeting. He said that the greatest good would come from stimulating discussions and the pooling of ideas.

In concluding, Mr. Wright said that the Seminar was not only an expression of the partnership which existed between the South Pacific territories through the South Pacific Commission, but equally an expression of the urge towards still greater partnership in public life between men and women of the world.

Traditional Ceremony Of Welcome

At the end of the ceremony, the official party, delegates and guests were entertained at morning tea by the Seminar participants, and immediately afterwards the work of the Seminar began.

In the afternoon, participants were accorded a traditional Samoan welcome by representatives of women's committees of Western Samoa.

SPC–FAO Fisheries Training Centre Opened

THE Fisheries Training Centre organized jointly by the South Pacific Commission and the Food and Agriculture Organization at Tulagi, in the British Solomon Islands, with the active support of the Protectorate Government, was declared open by His Excellency the High Commissioner for the Western Pacific, Mr. D. C. C. Trench, C.M.G., M.C., on September 1.

Twenty-five trainees are attending from Netherlands New Guinea, Papua and New Guinea, the Solomons and the New Hebrides. Director of the Centre is Mr. Pierre Lusyne, Gear Technologist of the Fisheries Division, Food and Agriculture Organization. (Mr. Lusyne was co-Director of the first SPC-FAO training course held at Commission headquarters in Nouméa in 1956-57.) Assisting him are four instructors—Messrs. J. Kemsley (Food and Agriculture Organization), Ronald Powell (Fisheries Officer, Cook Islands), M. Aylett (Fisheries Officer, British Solomon Islands), and Louis Devambez (Assistant Fisheries Officer, South Pacific Commission).

In his opening address, Mr. Trench said he was glad to see that the emphasis was to be on practical work, and that most of the training would take place at sea under commercial fishing conditions. He also drew attention to the fact that the boats to be used during the training course had been built at another training centre, also organized by the South Pacific Commission and the Food and Agriculture Organization.

Replying to the High Commissioner, Mr. Lusyne said that fisheries had tremendous potential in relation to the problem of world food production, and that the best way to develop them was by means of training centres similar to that at Tulagi. Generally speaking, fishermen, wherever they lived, had a fund of methods and techniques which had been proved through the ages at the subsistence level. The task of the instructors was to build upon this foundation as much as possible.

The Centre will run six days a week for ten weeks, to complete an intensive course that includes not only practical fishing operations at sea, but the rigging of lines and nets, the making of equipment such as large fixed fishtraps, and the mechanization and maintenance of fishing craft.

Health Education Courses In Tahiti

In Tahiti during August, Miss Liliane Geisseler, SPC health education officer, conducted two courses in health education. Both were held at Papeete.

The first course, held from August 1-25, was for health personnel, including eleven male and female student nurses and two midwives from the Health Department, four auxiliary social workers from the Department of Social Service, and six inspectors from the Institute of Medical Research.

The second course, held from August 15-26, covered health education in schools. It was attended by twenty-eight teachers from outlying islands of French Polynesia, including the Tuamotu, Austral, Marquesas, and Leeward Groups. As most of those who attended were from islands where there are no doctors, a refresher course in first aid and simple medical care was included.

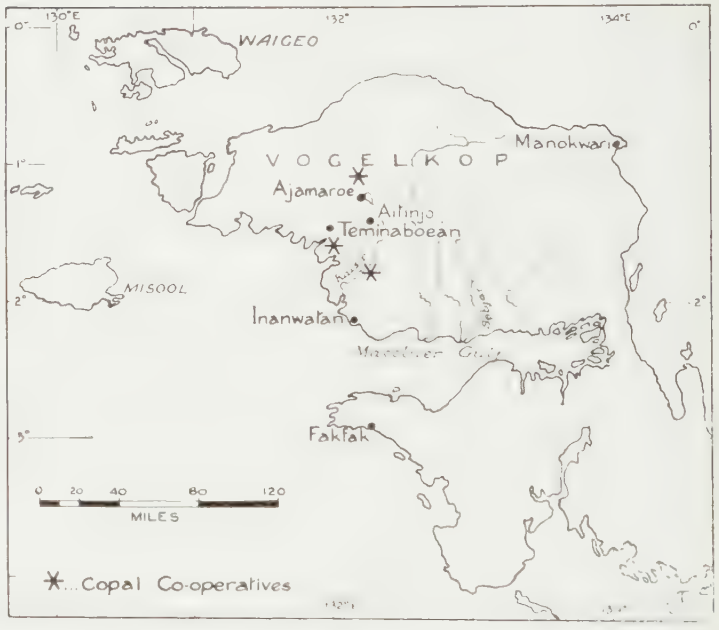
Before returning to headquarters on September 16, Miss Geisseler spent a week on Moorea Island assisting the local health inspector with health education activities.

Copal Co-operatives Of Netherlands New Guinea

In the Teminaboean area of Netherlands New Guinea, large stands of the conifer AGATHIS LABILLARDIERI *are regularly tapped for their valuable copal, a resin used mainly in the manufacture of special paints. In the past five years, co-operatives formed among the Papuan copal workers have proved, through savings, an important means of capital formation.*

By P. J. van DOOREN*

A Forestry Department assistant demonstrates how an Agathis tree should be tapped for its resin.



Map of north-west Netherlands New Guinea, showing location of copal co-operatives.

DUE to the combined efforts of the population, the Administration, the Forestry Department and copal co-operatives, the mountain area in the south-west Vogelkop, particularly around Teminaboean, is experiencing an economic development which affects the whole population. Apart altogether from the material advantages it provides, this has enabled the population to free itself for ever from the "kain timoer"[1] and to replace the former bartering of lengths of fabric by a new activity which brings in money in the true sense of the word, thus contributing to the country's prosperity.

The Teminaboean area supports 25,000 inhabitants and boasts large natural stands of *Agathis labillardieri,* the tree which provides the valuable copal gum.

Although the population had already taken advantage of this natural resource and sold copal before the war, production on a large scale has really developed only in the last few years, when the Forestry Department started helping people to improve the quality of copal and to protect their natural capital by teaching them the proper way to tap the trees, and by forming copal-producing co-operatives.

There are at present three such co-operatives in the Teminaboean area. In 1958, production reached the record figure of 152,000 kilograms[2] of copal (20% of the total production in Netherlands New Guinea), with a value of £stg.25,000.

Early Development

Until 1954, living conditions in this particular area were extremely poor. That year the Forestry Department became interested in the production of copal. It is true that a Chinese trader used to purchase copal sporadically, but there was no organized production. The inhabitants would bring the copal to the coast by canoe, sometimes journeying over seventy miles. The product delivered in bulk was dirty and of poor quality. In many cases trees were submitted to excessive tapping. Properly tapped, the Agathis can produce copal for twenty-five to thirty years and still provide good timber. So, in order to protect the reserves, the Forestry Department has taught the population the correct procedure for tapping, and also purchases their production.

At first the Department offered the same price as the Chinese trader, but it also undertook the grading, transport and sale of the product and, by thus improving the quality, was able to double its value on the world market.

The increased profits could well have been handed over immediately to the producers. However, they are still a very

[1] The "kain timoer" are the lengths of fabric given to the indigenous population by the birds of Paradise hunters. When the hunting came under stringent control these materials acquired a bartering value. Until recently, they were a very important part of the bride price and had in fact given rise to a real "fabric economy" with a credit and bartering system. They were systematically destroyed in 1954.

[2] One kilogram equals 2.2 lbs.

* Dr. van Dooren is Officer for Native Commercial Development in the Department of Economic Affairs, Netherlands New Guinea.

primitive people and there was the risk that they would suddenly find themselves in command of large sums of money for which they had no use. It was feared that this sudden opulence, coupled with the rather limited demand at the time, would cause a sharp drop in production.

The Formation Of Co-operatives

It was decided actively to include the Papuans in the operations of grading and transporting the copal by forming producers' co-operatives. Initially these were managed by the Forestry Department and then handed over to the Papuans themselves, with the Department merely supervising the tapping and grading, checking the quality, and facilitating the sale and shipping.

The producers still receive the original price of 1/3d. per kilogram of copal delivered. This is only a fraction of the quotation for good-quality copal on the world market (2/10d. to 3/5d.).

The first instalment is usually spent on consumer goods. The second is paid six months after delivery, when the net profit on sales has been reckoned and the cost of grading and transport deducted. The entire amount of this second instalment is paid to the co-operative, and therefore represents the member's savings. The profits of each individual are carefully recorded. Some producers who make only sporadic deliveries may save but a few shillings, whereas others have accounts running well into double figures.

Thanks to these collective savings the oldest co-operative, registered in 1957, has been able to purchase copal directly from the producers and pay them cash, to set up a shop, and even to invest in a boat to ship the product to the grading and packing centre. This boat is a great asset, since the River Kais can now be used for quick transport, whereas formerly the copal had to be carried on foot to the centre at Kampong Baroe. As a result each individual produced at one time only as much copal as he could carry in one day (20 kg.). Now the copal is taken directly to the river for shipping, and it has also been possible to open up and work some Agathis stands located further upstream.

The transport problem is much more difficult in the Ajamaroe area where there are no rivers. The copal must be carried by plane at 5d. per kilogram. True, this is not excessive in view of the price quoted on the world market for the best copal; the main difficulty rests rather with the limited useful load of the aircraft.

In a year or two it will probably be possible to transport copal by lorry on the proposed Ajamaroe-Teminaboean road.

Papuan copal tappers at work. The Forestry Department has developed an improved method of tapping that gives maximum resin flow without damaging the tree.

Co-operative Stores

In 1957, to enable the population to benefit from its increased income and also to encourage production, the same co-operative opened a store in the copal marketing centre. The store sold many items which were until then unknown to the local population. Since tinned meat and fish, condensed milk, rice and special foods for children can be purchased there, the health of the community also benefits from the venture.

The co-operative now runs three stores, whose turnover in 1960 was £stg.8,000. The supplies for them, the purchase of copal and the payments made are financed exclusively from the reserve fund accumulated through deferred payments. The co-operative members, who are all kept informed about the procedure, understand full well that all this is the result of their own efforts, and are proud of it.

Share Issue In 1958

To emphasize the advantages of the method, in 1958 members were given 30% of the reserves accumulated from 1954 to 1956 in cash and the rest in shares. According to the bylaws of the co-operative, which was formed in 1957, the extra payments which are due since this year are divided up in the following manner: 40% in shares; 30% in cash; 30% to the co-operative to cover overheads, staff salaries, etc.

Shares may be sold only to—or through—the society. To ensure this a record is kept of all shareholders. At the first issue in 1958 only 10/- shares were distributed, and the rest of the monies due to the various members was given them in cash. Many members, however, now prefer to make up the difference and purchase another 10/- share, and there are now producers who own 10 or 12 shares. At present the society's savings amount to approximately £stg.7,000.

Obviously this is an important means of capital formation among the Papuans. The higher income they receive from the sale of their copal is not all spent immediately, but saved for more permanent purposes such as improvements in housing, purchase of equipment, tools or household goods, etc. Thanks to the encouragement of thrift, production has increased instead of dropping as it would do if all gains were paid out at once, in which case it would start again only when the producers were in need of money.

Share System Popular

The share system is popular with the Papuans. Many copal producers proudly carry their certificates around with them in a plastic wallet. The shares have become a real symbol of prestige and wealth, and have replaced the "kain timoer". It remains to be seen if they will also take their place in marriage contracts and if, through the co-operative, they will work their way from the prospective bridegroom's family to that of the bride-to-be.

Manihiki Lagoon Opened For Pearl Shell Fishing

On August 1, Manihiki Lagoon in the Cook Islands was opened for the taking of one hundred tons of pearl shell. The lagoon will be closed again on November 30—earlier, if the hundred-ton limit is reached before that date. Up to six diving machine licences are being issued.

An area in the lagoon of approximately seventy acres will be set aside as a reserve to enable a scientific study of pearl shell, now in progress, to continue without being affected by diving operations.

Dr. Norma McArthur, who for some years has been working on the population statistics of Pacific territories, and, aided by the Commission, has undertaken extensive field work.

On Gathering Population Data

INTRODUCING POPULATION STATISTICS is the title of a recently-published handbook written to assist people engaged in demographic work in the Pacific. It was prepared for the South Pacific Commission by Dr. Norma McArthur, of the Demography Department of the Australian National University, and is reviewed below . . .

by CYRIL S. BELSHAW*

DR. NORMA McARTHUR'S book[1] is a long-awaited summary of the ideas and methods which she uses in administering censuses. Dr. McArthur's interests in this field have gained for her the respect and admiration of all those who have seen to what effect she has laboured to bring intelligent uniformity to census practice in many territories. Rarely indeed has one person in the Pacific had such a widespread and clearly focussed influence.

Her new book is called *Introducing Population Statistics*, but it is not quite that. It might almost be called *Handbook For Census Officers In The Pacific Territories*, for the problems considered are nearly all those which arise in connection with territory-wide censuses, and the illustrations are drawn pertinently enough from material dealing with the Pacific territories. The elements in census technique are clearly and unequivocally presented, so that the notions of population cohorts, age-specific mortality rates, sampling design, or median age are stripped of their mystery and become to the most inexpert reader precise tools to assist in the interpretation of population characteristics.

In one sense, the book is perhaps too clearly and simply written for the professional census administrator, who should have many of these matters under control before embarking upon such a task. The reader, then, is more likely to be an intelligent layman interested in interpreting for himself population data fed to him through the census machinery. Most census reports are necessarily summary things, with minimal interpretations. Then come the journalists, commentators, politicians, historians and anthropologists, each ready to use the material for his own ends. Here, Dr. McArthur's work should come into its own, and I hope for the sake of the future social analysis of the Pacific that each new census taken will include in the Preface some such statement as "In referring to interpretations drawn from this census material, please observe the cautions outlined in *Introducing Population Statistics*". If this is done, responsible interpretation should increase.

Dr. McArthur's approach is frankly that of a biologically-oriented statistician. She is interested, for example, in the question as to whether fertility is affected by longevity, and the characteristics of a population which affects its structure are those of age and sex. She does not explore, and would possibly argue that it is not her business to explore, the ways in which social factors affect attitudes towards social rôles of persons in various age-groups or of different sexes. It is indeed very difficult for official censuses to use material in ways which can take into account variations in such attitudes. For example, if we are to compare, on the basis of census material, the available labour force in various territories as a proportion of total population, we could only do so on the assumption that the working population fell between age categories reasonably well described in the census. Since there is a considerable variation in the concept of work, and of labour force, not only between territories but within them (think of Papua, for example) deductions made on such a basis would at best be but rough and ready.

A census is in fact not an ideal instrument, nor yet a precise one, and there is a danger that it may be interpreted as both. Dr. McArthur does not, I feel, face up to these limitations firmly enough. There is, for example, an implied argument throughout that a census is always more accurate and useful than a system of registration. Where there is a discrepancy between the figures of the one when compared with those of the other, Dr. McArthur argues against the results of the registrar.

I would be the last person to claim that registry figures are accurate, as they exist in the Pacific Islands. But surely this argument is pressed too far. When I was in Fiji recently I had occasion to use the figures of the Census of Fiji, 1956, which by all criteria was the most sophisticated and best of censuses achieved in the South Pacific Islands. For particular villages, I found considerable discrepancies between the populations reported in the census and the enumeration that I personally made over a period of months. The discrepancies were too large to be accounted for by natural increase, and I could only conclude that perhaps the precautions taken to avoid double-counting in the census had back-fired and resulted in considerable omissions. The patterns of visiting and counter-visiting in Fiji make this almost inevitable. It is only after a long series of censuses has been undertaken, supported by comparison with registry material, and even more by spot checks in sociological depth, that census administrators can determine, for each variant of culture, what the consistent

(Continued on page 36)

* Director, Regional Training Centre for United Nations Fellows, Vancouver, and Professor of Anthropology, University of British Columbia.

[1] Norma McArthur: *Introducing Population Statistics*. Published under the auspices of the South Pacific Commission and the Australian National University. Melbourne, Oxford University Press 1961.

INTRODUCTORY NOTE

The fourth South Pacific Conference held at Rabaul in 1959 asked the South Pacific Commission to explore the possibilities of holding inter-territorial sports tournaments "with the purpose of fostering better relations and understanding".

After considerable exploratory correspondence and discussions, the Commission convened a preliminary meeting at its headquarters last March. Representatives attended from Fiji, Cook Islands, French Polynesia, American Samoa, Western Samoa, New Caledonia, New Hebrides, Netherlands New Guinea, and Papua and New Guinea. The Commission also invited Mr. Alwyn Moon, Secretary of the Auckland Amateur Sports Association, to attend as a consultant experienced in the organization, management, and financing of large sports gatherings.

The meeting made three major decisions:

(i) That a regional Pacific Islands sports tournament known as the South Pacific Games should be held every three years;

(ii) that a body to be called the South Pacific Games Council should be set up to organize these gatherings; and

(iii) that Fiji be invited to stage the first South Pacific Games in Suva.

The article below—a brief progress report on subsequent developments—was contributed by Mr. L. O. Simpson, who was Chairman of the preliminary meeting and has since been elected Secretary of the South Pacific Games Council and of the Organizing Committee for the first South Pacific Games.

RICHARD SEDDON,
Executive Officer for Social Development,
South Pacific Commission.

At the South Pacific Games meeting held at Commission headquarters last March. Left to right: The Secretary-General of the South Pacific Commission, Mr. T. R. Smith; Mr. L. O. Simpson, of Fiji, who was elected chairman of the meeting; and Dr. Richard Seddon, the Commission's executive officer for social development.

South Pacific Games In Suva In 1963

Excellent progress is being made towards the holding of the first South Pacific Games in Suva in 1963.

By L. O. SIMPSON

WITH the assured support of the Fiji Government, the first South Pacific Games will be held during August-September, 1963, at Buckhurst Park, Suva. They will be staged by the Fiji Amateur Sports Association which, as the sporting body in the host territory selected for the task, has nominated the officers of the controlling authority for the first Games—the South Pacific Games Council. They are:

CHAIRMAN: L. R. Martin. Mr. Martin is president of the Suva Rugby Football Union; President of the Suva Rotary Club; Director of the Fiji Red Cross; and a prominent Suva businessman and patron of sport.

SECRETARY: L. O. Simpson. Mr. Simpson is the Secretary-Treasurer of the Fiji Amateur Sports Association, the Fiji Amateur Athletic Association, the Fiji Show Association, and the Suva Centre of the Fiji Amateur Athletic Association.

TREASURER: S. W. Meeks. Mr. Meeks is the President of the Fiji Table Tennis Association; President of the Suva Centre, Fiji Amateur Athletic Association; and Vice-President of the Fiji Amateur Sports Association. Mr. Meeks has had a longer association with amateur athletics in the Colony than any other person, having been an officer of the now defunct Southern Districts Athletic Association.

Strong Support From Fiji Government

As the Fiji Amateur Sports Association does not possess the resources that will be needed successfully to stage a regional sports tournament of the magnitude of the first South Pacific Games, an appeal for assistance was made to the Fiji Government.

The response was most encouraging. The Government expressed satisfaction that the first Games will be held in Fiji, and approved grants totalling £15,600 to provide improved facilities at Buckhurst Park. These will include a new grandstand under which showers and changing rooms will be provided (£8,000); an area for basketball, boxing and tennis (£5,900); terraced seating in the open (£500); and improved facilities for the admission of spectators (£200).

Officers Of Organizing Committee Elected

With this support assured, the Association proceeded at its next meeting to elect the officers of the Organizing Committee for the first South Pacific Games. They are:

CHAIRMAN: J. H. Common. Mr. Common is the Director of Public Works; the Chairman of the Management Committee of the Fiji Amateur Boxing Association; and Patron of the Public Works Department Sports Club, the largest in the Colony.

SECRETARY: L. O. Simpson (see list of Games Council officers above).

DEPUTY SECRETARY: K. C. Gajadhar. Mr. Gajadhar is the Secretary of the Fiji Hockey Association, and was for some years the Secretary of the Fiji Cricket Association. He was manager of the Fiji Hockey Team which toured New Zealand in 1960.

SOUTH PACIFIC GAMES . . . EMBLEM DESIGN COMPETITION

A first prize of £stg.40 is offered for the best design for an emblem for the first South Pacific Games, which will be held at Suva, Fiji, in August-September, 1963. Second prize will be £stg.10. The winning design may be adopted as a permanent emblem for the Games.

The conditions of entry are that—

(i) The design should embody the words "SOUTH PACIFIC GAMES 1963";

(ii) entries should measure 5½" x 7½";

(iii) up to three colours may be used (black and white count as separate colours);

(iv) the design should be suitable for a postage stamp or medal.

Full copyright in respect of the winning entries will be vested in the South Pacific Games Council.

Entries will be judged more for the idea each embodies than for artistic merit; hence designs need not be finished to professional standards.

Entry is free, and any number of entries may be submitted. Entries must reach the Secretary, Organizing Committee, South Pacific Games, P.O. Box 124, Suva, Fiji, not later than December 31, 1961.

[Competitors wishing to have their entries returned to them should enclose a stamped addressed envelope. In the case of competitors resident outside Fiji, an addressed envelope with an International Reply Coupon should be enclosed.]

TREASURER: S. W. Meeks (see list of Games Council officers above).

In order that the Organizing Committee may be as representative and efficient as possible, its officers have power to co-opt.

Programme Probably Finalized Soon

It appears likely that the entire programme of the first South Pacific Games will be finalized before the end of the year. The following sports will probably be included: Swimming; men's basketball; women's basketball (seven-a-side); boxing, rugby football; table tennis.

In addition, it is hoped to organize demonstration games of volleyball and baseball, for which events the Organizing Committee will issue specific invitations. Adequate facilities for all these sports either exist or will be constructed before the Games.

Competition For Games Emblem Design

In order to find a suitable motif for the games, the South Pacific Games Council invites artists from all parts of the Pacific to design an emblem suitable for reproduction in not more than three colours in letterheads and posters, and also suitable for incorporation in the reverse design of the medals which will be presented to all winners at the Games.

The design should have a South Pacific motif, and reflect the cohesive nature of sport in bringing all peoples together. Details of the competition—entry for which is free—accompany this article.

Full Representation Wanted

If the first South Pacific Games are to be a success, all territories should be represented. The important thing is that all should take part; success in the competitions is of lesser importance. Selections of teams should certainly not be influenced by apparent higher levels of attainment in other territories.

All territories should select their best performers to the limit of available finance, and give the selected athletes the honour of representing their territory at the first South Pacific Games in 1963.

On Gathering Population Data

(Continued from page 34)

errors are likely to be, and correct for them.

Let me give one further example of the difficulty that faces an enumerator. As an administrative officer in the Solomon Islands in the latter years of the war I was faced with the task of bringing village lists up to date. Avoidance of enumeration, for political or economic reasons, or motives related to the inconvenience of the enquiries, was legion. In many instances, it was only after running across individuals in the course of other duties, or after several surprise visits undertaken over a period of months or years, that the lists became reasonably accurate. It is indeed a favourite game of young, keen patrol officers to find fault with the lists of earlier officials, and an easy one to play. Yet this difficulty would have applied whether I had been registrar or census enumerator, and only as a registrar in continuous contact with the people did I have an opportunity of rectifying mistakes which would not have been clear to an enumerator.

Dr. McArthur's work is excellent at the level of the national census; she is at home with the complex tables and the clear description of the interesting things that can be derived from them (and simply, too). But curiously, for one who has such intimate contact with the very human Pacific, village life and the relationships of government officials to that life, seem remote. Outside of the territorial census office, the administrator wants to know what is going on in his district. He has population material on file, and he wants to know how to use it. He wants to know how to gather it from day to day, and how to ask the questions which will give him the sociological and economic data, as well as the biological, relevant to his problems. With some ingenuity, such an official could develop his own census (or registration) cards, design a sample, and amend some of the calculations to suit his material. But for the most part, he would use the book as a starting point, an inspiration for further ideas.

Between the islander interviewed by an enumerator, and the calculating machine, there is a wide gap. Perhaps wisely, on this occasion Dr. McArthur has not attempted to fill it. But those of us who know of her work and her methods will be waiting for a further volume in which her substantive conclusions about the nature of Pacific Island populations can be displayed, and then, surely, she will tell us what happens when a Pacific Islander and an administrative officer come face to face, the one counting the other, each in his own way influencing the ultimate statistic.

Male and female flowers, leaf, and young fruit, of the Guamanian breadfruit variety LEMAI.

Artocarpus mariannensis, a wild seeded breadfruit variety found on almost all islands of Micronesia.

The Breadfruit Tree In Micronesia

A survey of the breadfruit tree in Micronesia was carried out recently as part of a Pacific-wide investigation by the South Pacific Commission into the possibilities of prolonging yield.

By JAN COENEN and JACQUES BARRAU*

THE breadfruit tree, *Artocarpus altilis*, belongs to the same family as the fig and the mulberry. Its centre of origin would seem to be within a rather large area, including the Indo-Malayan Archipelago and New Guinea and extending northward as far as western Micronesia. The tree seems to be of hybrid origin.

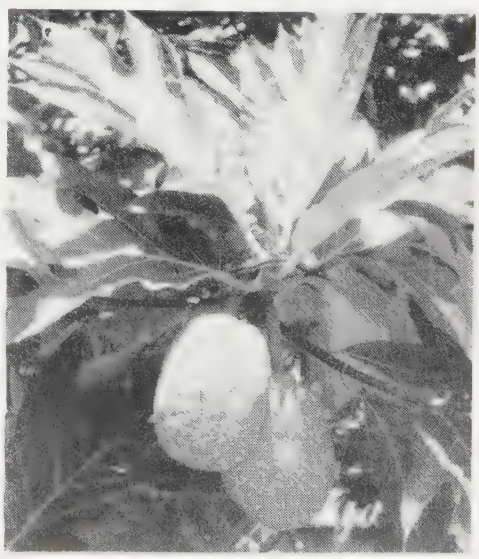
In Oceania, the breadfruit tree is of such importance as an economic plant that it can almost be considered as a symbol of the South Sea islands. Notwithstanding this and its great popularity as a food plant in the region, there is a remarkable lack of botanical knowledge about it and its variations.

This is the reason why the South Pacific Commission has undertaken a regional survey to gain more knowledge of breadfruit tree "varieties" and, if possible, the selection from this population of late or early, or year-round producing varieties. By this means it may be possible to extend the generally-limited fruiting season.

This survey was initiated in 1958 and has been carried out already in several territories of the South Pacific. Hundreds of root cuttings of interesting varieties have been collected and sent to Western Samoa, Tahiti and Fiji for comparative trials, while the introduction of Polynesian "varieties" into Micronesia for the same purpose is now being arranged.

The Breadfruit Tree In Micronesia

One of the co-authors of this article



Breadfruit variety PALADA, which is common on Guam.

* Dr. Barrau, SPC Executive Officer for Economic Development, initiated the survey in 1958, and has covered a number of territories since. Recently Mr. Coenen, Plant Introduction Officer, spent some weeks continuing the study in Micronesia.

Female flower (lower left), male flowers, leaf, and (above the knife) young and mature fruit of the Marshallese breadfruit variety MEJWAAN. This seeded variety, which is very common on almost all atolls in the Marshall Group, is quite resistant to brackish water.

recently paid a visit to Guam and the United States Trust Territory of the Pacific Islands. Over 300 root cuttings of 36 interesting Micronesian varieties were, as a result of this visit, sent to other territories in the Commission area. In this shipment were Guamanian breadfruit trees called locally PALADA and LEMAI. Both are seedless, and their main fruiting season is between February and July.

An interesting point concerning the breadfruit tree on Guam is the occurrence on this island, as well as on certain other islands to the far west of Micronesia, of a wild seeded breadfruit tree used locally both for its seeds and the flesh of its fruit. This wild breadfruit is locally called DUGDUG and is quite different, botanically speaking, from the common breadfruit tree cultivated in the South Sea islands. Generally it has entire leaves, the veins of which present a typical reddish hairiness. This characteristic is found in a number of Micronesian cultivated varieties of breadfruit trees, which have probably inherited it through natural hybridization. As a matter of fact, it would seem that man, in the course of his migrations, has introduced this *Artocarpus mariannensis* to other islands to the east.

In the United States Trust Territory of the Pacific Islands the widest range of cultivated varieties of the breadfruit tree is found on the islands of Truk and Ponape. On each of these islands at least fifty different breadfruit trees are distinguished by the inhabitants. Root cuttings of nearly twenty of them, early and late producing, were collected and sent to Samoa, Tahiti and Fiji.

For the main part, the Trukese and Ponapean breadfruits are seedless. The season of maximum production in these islands begins in April-May and extends until August-September, peak production being reached in July. Besides the main season there is some fruiting between November and February, but the yield is much smaller.

In Ponape the earliest variety seems to be the one called MAI-UP, bearing fruit from early May until the middle of June. However, the most popular and productive variety is LUKUWAL, fruiting later than MAI-UP. On Truk the breadfruit season begins with the production of the MEI-CHON and ends with the MEI-KOCH variety.

Breadfruit Varieties On Kapingamarangi Atoll

Following a special request from French Polynesia, and with the assistance of a generous grant from M.

Preparation of a breadfruit meal (TI-KUL PALPON). Left (top): Woman nearest camera is peeling a breadfruit while other woman is making coconut cream. Unpeeled breadfruit in basket. Left (bottom): Woman wrapping peeled breadfruit in breadfruit leaf; the whole is tied with pandanus leaf string. In box are cores and seeds of breadfruit. Right (top): The peeled breadfruit, wrapped in leaves, is then placed on hot coral stones. The three coconuts on the left are filled with a mixture of breadfruit and coconut meat. This meal is called SAKATE. Right (bottom): The whole is then covered with a mat and thick layer of sand. For this particular breadfruit meal cooking takes about one hour.

le Baron J. Jaunez of Papeete (who was very interested in introducing Kapingamarangi breadfruit trees to the atolls of the Tuamotu Archipelago), a visit was paid to this atoll, which is an isolated island in the Eastern Caroline Islands.

It is interesting to note that the present inhabitants of Kapingamarangi Atoll are of Polynesian origin. However, the breadfruit trees grown on the island are seeded varieties called TI-KUL KIRINIS, TI-KUL DEWED and TI-KUL PAWER which present characteristics of the western Micronesian breadfruit trees, including the typical hairiness of *Artocarpus mariannensis*.

Ponapean seedless breadfruit varieties, such as MAI-TEIT, MAI-UP and MAI-N-PATAK, were introduced around 1935 to the atoll. Another fairly recent introduction is the breadfruit tree called TI-KUL NUKUOR, introduced, as its name implies, from the neighbouring atoll of Nukuoro to the north of Kapingamarangi. In spite of the fact that we were told that this variety was originally introduced from Western Samoa into Nukuoro, the TI-KUL NUKUOR found at Kapingamarangi is a seeded one and, in addition, has the *Artocarpus mariannensis* hairiness.

The three seeded varieties found on Kapingamarangi—TI-KUL KIRINIS, TI-KUL DEWED and TI-KUL PAWER—are reported to bear fruit only once a year for a period of approximately three months—December to March—while the more recently introduced varieties bear fruit two or even three times a year.

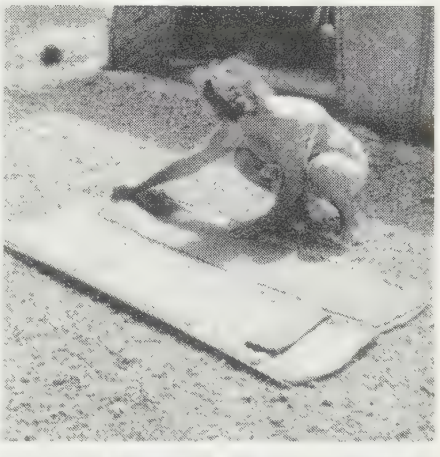
Preparation Of Breadfruit On Kapingamarangi

There are numerous methods of preparing fresh picked breadfruit. It is often combined with other ingredients such as coconut cream and grated coconut meat.

The simplest way of cooking fresh breadfruit seems to be by placing it on a bed of hot coral rocks which have been heated beforehand in a shallow pit. After roasting for two hours the breadfruit is cooked, the rind and core removed, and it is ready for consumption. Another method is to peel and cut the fruit and then cook it in boiling water.

A most popular breadfruit meal is called TI-KUL PALPON. To prepare this, the breadfruit is taken when nearly mature and stored until it ripens. Rind, core and seeds are then removed and the hole left by the core filled with coconut cream. The hole is then plugged with a section of the core, and the fruit is wrapped in green breadfruit leaves tied with a pandanus leaf string. The whole is then baked for an hour in a native oven made from hot coral rocks which are covered first with a mat and then with sand. Many more recipes for cook-

(Continued on page 65)



Processing of TIPAK—breadfruit preserved in sheet form—on Kapingamarangi Atoll. Left (top): Harvested breadfruit ready for preservation. After being washed, they will be placed on the layer of green breadfruit leaves in the background for one or two nights, to soften. Left (centre): The breadfruit is then peeled and cored, and placed in a basket of coconut leaves. Left (bottom): It is then cut up fine and cooked in a native oven underground. Right (top to bottom): After cooking, the breadfruit is mashed and pounded in a wooden bowl. The paste is then spread out on mats to dry in the sun. After drying the sheets are flexible, and dark brown in colour. The sheets are then rolled in cylinders, wrapped in pandanus tied with string and stored.

The first Ctesiphon building in course of construction at the Raiwaqa Housiing Estate. Left: The timber frames being placed in position while hessian is being spread over the structure outside. Right: Father Hurley (on ladder) directs the work. After the third coat of cement mortar, the roof is strong enough to support a man.

Unique Low-Cost House Being Tested In Fiji

A building method in use four thousand years ago in the Middle East is being tested by the Fiji Housing Authority. Hessian and cement are used as basic materials in an arched form of construction.

By H. H. MADAMS

Members of the Suva City Council inspect the finished building, which is now used as an office. The Council later gave permission for ten Ctesiphon homes to be erected.

THE Ctesiphon method of building construction takes its name from the ancient town of Ctesiphon near Baghdad where the first known arched building of this kind was built some 4,000 years ago—and still stands in what is said to be an earthquake area. Its development in modern times with the use of concrete corrugations is due to Major J. H. de W. Waller. This type of construction was introduced to Fiji by Father D. P. Hurley of the Roman Catholic Mission, after studying Major Waller's work.

The three main principles governing the construction of concrete arch buildings are:

(i) Concrete is most efficiently used in the shape of an inverted catenary, the shape of the true arch;

(ii) corrugations increase the stiffness and strength of a thin plate; and

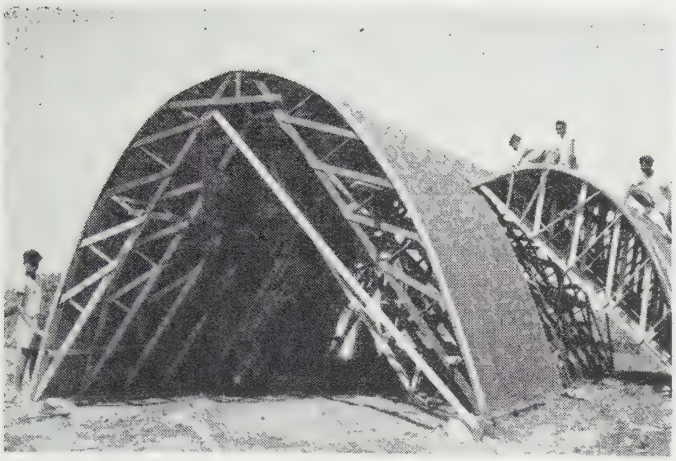
(iii) corrugated concrete shells can be cheaply produced on flexible moulds.

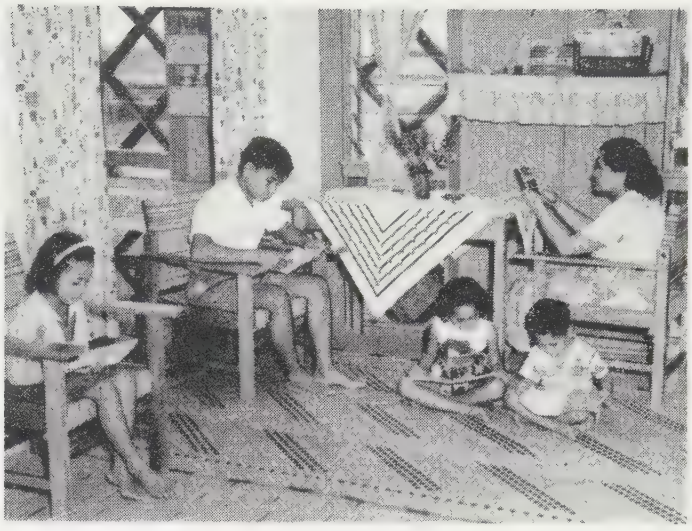
Ctesiphon buildings are constructed by first erecting, in line, wooden forms shaped to the catenary curve. These are covered reasonably tightly with hessian, and cement mortar is then applied in successive layers until the required thickness is obtained. The "sagging" which occurs in the hessian, between the forms, produces the corrugations in the finished shell. V-shaped expansion/contraction joints are formed with a bitumenous mastic. The forms are removed when the cement has set, and are re-erected for the next building.

No reinforcement was embodied in the Ctesiphon houses built by the Fiji Housing Authority, although this can be done if greater strength is needed. A Ctesiphon built in England at the Building Research Station, Watford, reinforced with 3″ hexagonal galvanized wire mesh (13 S.W.G.) and $\frac{3}{8}$″ diameter M.S. rods, withstood a simulated wind of 85 m.p.h. without any signs of cracking. How the unreinforced Ctesiphon will withstand winds of hurricane intensity has yet to be discovered.

First Ctesiphon Erected In 1959

After inspecting a Ctesiphon building at Ba, Fiji, built by Father Hurley with the aid of a grant from public funds, the Housing Authority decided to construct an experimental Ctesiphon on the Authority's Estate at Suva. Before this





Above: The ten dwellings differed from the first Ctesiphon building in having perpendicular end walls of timber, and an additional arch forming the kitchen and toilet recess. Right: A family relaxes in its Ctesiphon home. The kitchen recess can be seen in the left background.

could be done, however, a dispensation had to be obtained from the Suva City Council. The local building regulations do not provide for buildings of this nature. The City Council, which is fully awake to the potential seriousness of its housing problem, proved sympathetic towards the experiment, and permission was given for the erection of this type of building under strict control on the Authority's Estate.

The first Ctesiphon building was begun in April 1959 and completed in June. The total cost of the work was £250.19.9d (Fijian), or 15s.2¼d. per square foot. This included site excavation, and the hire and transport of forms used by Father Hurley. No sanitation, drainage or electricity was provided, since the building was of an experimental nature. It is now in the third year of daily use as an estate office and apart from a few minor cracks there have been no signs of deterioration. Periodic application of a cement paint has proved sufficient to seal small hair cracks.

Experimental Ctesiphon Village

The Housing Authority extended its experimentation with arch buildings to the construction of ten houses, comprising the Ctesiphon village at Raiwaqa. This proved a somewhat difficult undertaking. A temporary building gang had to be recruited, the Authority not normally entering into direct construction. The fact that the services of workers would have to be dispensed with when construction was completed had a deleterious effect on morale—the tendency was for work to be drawn out as much as possible.

Two further difficulties, encountered from the outset, lay in the shortage of materials, particularly local timber; and the complication of construction by a change in design. Perpendicular timber end walls were introduced, together with an additional "wing" for use as a kitchen. The wing was formed by springing a second arch from the side of the main building. Electricity supply, a separate toilet and shower, and septic tank drainage are provided in these houses.

The ten families living in the Ctesiphon houses (five Fijian and five Indian) quickly settled down into contented living. In the early months there was some concern over cracks in the concrete shells and consequent leaks during heavy rainfall. The use of a silicone water-proofing agent appears likely to remedy this fault. It is thought that greater care in the mortar mix, and more compaction in its application, will go a long way to avoiding this trouble in any future Ctesiphon buildings erected by the Authority.

The Housing Authority is guarded in its appraisal of these buildings. Costs have not been as low as was anticipated, although it is certain that an improvement in this respect would follow on more experience. The buildings have not yet been proved under hurricane conditions, and the trouble from leaks in the early stages cannot be denied.

But the fact remains that ten families who formerly lived in overcrowded, insanitary rooms for which they paid exorbitant rents are now living contentedly in homes—albeit unconventional ones—which may one day be their own.

A general view of the Ctesiphon village at Raiwaqa. The homes are grouped round a central open space.

Papuans Grow Cocoa In Netherlands New Guinea

(Continued from page 25)

at 3′ intervals. Thus early shade is provided which prevents further growth of the alang-alang grass. Next, the area between the strips is cleared and planting holes for the cocoa seedlings are dug between the shade rows, 13′ apart (see Fig. 2).

After six months the cocoa seedlings are taken from the nursery and planted. To provide temporary shade in the beginning, *Crotalaria anagyroides* is also sown in a single furrow about 4′ long on both sides of each planting hole at a distance of about 3′.

Papuan women learning simple garment making.

IN PAPUA AND NEW GUINEA . . .

New Ways Of Learning For Village People

Through various channels, including village clubs, committees, and training centres such as that now being established at Milne Bay, the Administration of Papua and New Guinea is working to raise the general standard of village life by spreading education among the people.

By J. K. McCARTHY*

A SESSION of the territory's Legislative Council had just concluded, and I was chatting to two of the elected members, Mr. Kondom of the Eastern Highlands District and Mr. Tovin Tobaining of Rabaul, New Britain. We talked about the accelerated programme of formal education by which primary schooling would be given to the country's children. Already the first of the teachers had been posted to the village schools; their parents' ambitions were being achieved—at last even the child of the most isolated hamlet would be taught to read and write.

"Good! Good! Good!" said Kondom. "Our children walk on a new road—we older people never had the opportunity to go to school, but we must learn by other means so that mothers and fathers will be able to go the same way."

Kondom was always able to express well a basic truth—and Tovin Tobaining nodded in approval.

It is not possible to embark upon a programme of expanded formal education for children unless the adults take a part. A parallel development of the whole community is desirable so that no gap opens between the illiterate parents and their children who can read and write. So long as the adults have an equivalent knowledge there will be no such separation. The lack of formal schooling in the older generation must be replaced by other means of teaching.

The term "adult education", as I see it, has the broadest possible scope. One can hardly over-exaggerate the depth and width of its implications, for a true understanding of what may be taught a people covers almost every thought and act of their lives. The people of Papua and New Guinea are at the crossroads, and therefore the possibilities of adult education are immeasurable. There are nearly 2,000,000 people in the territory and over 1,000,000 of them are adults —these are the folk whom we have to reach so that an even development may be achieved between themselves and their children. Of necessity the approach to such teaching has to be selective and basic in subject in order that the mass of the people might benefit.

A women's group watch a cooking demonstration.

* Director of Native Affairs, Administration of Papua and New Guinea.

A staff house being built at the new women's training centre at Milne Bay. The donor of the land, Tilua (right), with Miss Alice Wedega, M.L.C. Right: Foundations for the dormitory, with kitchen and mess hall under construction at rear.

In many parts of Papua and New Guinea the womenfolk are assuming a new and greater importance. Perhaps they are less conservative than the male —they are often quicker to adopt new thought and new ways—and beyond all else they are better talkers!

New Women's Training Centre

The recently established Women's Training Centre in the Milne Bay District is an example of how knowledge is being brought to the village people.

In hundreds of small hamlets in the Milne Bay area of Papua there are groups of women working as village women's committees which provide a driving force in the agricultural extension programme in the District. Linked up with their male counterparts, who are formed into village agricultural committees, they belong to a network of associations and have a feeling of unity which is somewhat rare in the territory. Their local government councils look to them for support, and for the ideas which originate many of the projects undertaken by the Councils. Such an idea was the establishment of a rural training centre for women similar to that conducted by the Department of Agriculture for the men near Samarai.

Today the Centre is becoming a reality. At Ahiome on the north shore of Milne Bay a number of buildings are under construction, and it is hoped that by the end of 1961 the Centre will be staffed and functioning. It is being built in two stages with a dormitory, two staff houses and a kitchen provided first. Later the second stage of construction will provide additional dormitories, a lecture room, and an improved type of village house which will be used for classes on the proper care of the home. Food gardens will be planted to demonstrate modern agricultural techniques and to supply food for the trainees.

From the outset the project has been essentially one in which the whole community has joined. The original idea, fed into the Milne Bay Council, resulted in a gift of land for the Centre, promises of labour and building materials, the active support of the Council and a feeling of pride among the Milne Bay people. The Administration has made modest funds available for certain materials and will staff the Centre, but at all stages it will be geared to the needs of the people themselves.

Four Types Of Courses

The purpose of the Training Centre is to provide courses in home-making and citizenship for girls and women of the villages. Four types of courses are planned, as follows:

(i), a ten-day cooking and general homemaking course for village women;

(ii), a course of about six months in general domestic science subjects for groups of girls who have just finished their schooling and who are not planning to do any form of specialised training before marriage;

(iii), a two-week course for leaders of women's groups to assist them with club organisation and management;

(iv), a course of from three to four months for the training of assistant welfare workers for the field staff of the Social Development Branch of the Department of Native Affairs.

The Centre will be staffed by Papuans under the direction of the Milne Bay District Welfare Officer.

Keen Local Support

Papuans of the Milne Bay area are taking a keen interest in the project. The Council has its workboat hauling timber for the buildings and is making a daily payment of 2/- to voluntary workers on the project to meet their out-of-pocket expenses. Village women's committees are raising funds to purchase sewing machines and other equipment for the Centre.

The Milne Bay Training Centre is being set up as a pilot project, and knowledge gained from its operation will be used as a guide in the establishment of similar centres in other parts of the territory. Initially, club leaders and certain other classes of trainees will attend from various districts of Papua and New Guinea.

Widespread Interest In Women's Organizations

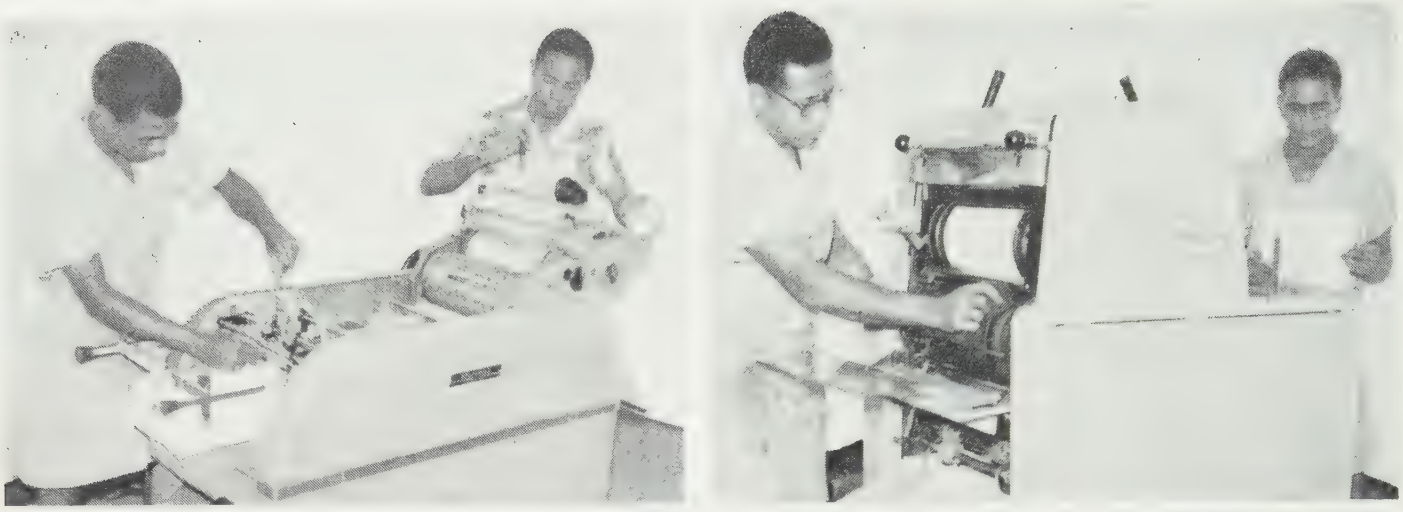
The need for the Centre developed from the widespread interest of the native people in women's organizations—particularly in village women's committees sponsored by the Extension Division of the Department of Agriculture. In other parts of the territory over two hundred women's clubs, with a membership of over eight thousand, are providing adult education among village women who have little alternative opportunity for acquiring new interests and skills or of obtaining the training necessary for raising the general standard of village life. Family courses are bringing husband and wife together to realise each other's place in society, and to foster an appreciation of the new emphasis on education for the adult.

The Training Centre at Milne Bay and the women's clubs are examples of how new ways can be taught and then spread to reach the mass of the people at village level.

Married Couples Attend Courses

There are other methods, and one which has proved most satisfactory is to invite married couples to attend courses conducted by the Welfare staff. The couples are selected as representatives of the various areas. They are the usual people of the villages, and it

(Continued on page 67)



The two printing machines. Above: Jason Makabori and Herman Pulanda printing on the Multilith, while on the right Cyril Nogah and Francis Tohe operate the Rotaprint.

SPC Literature Production Trainees At Work

At a training centre set up in Honiara early last year by the South Pacific Commission, UNESCO, and the British Solomon Islands Administration, eleven trainees from six Pacific territories are taking the second of three one-year courses in all aspects of literature production.

By E. P. W. MARRIOTT*

RESIDENTS of Honiara—and visitors—are often taken on conducted tours around the SPC Literature Production Training Centre. If *Bulletin* readers would care to accompany me on a similar inspection, I shall do my best to explain what is going on.

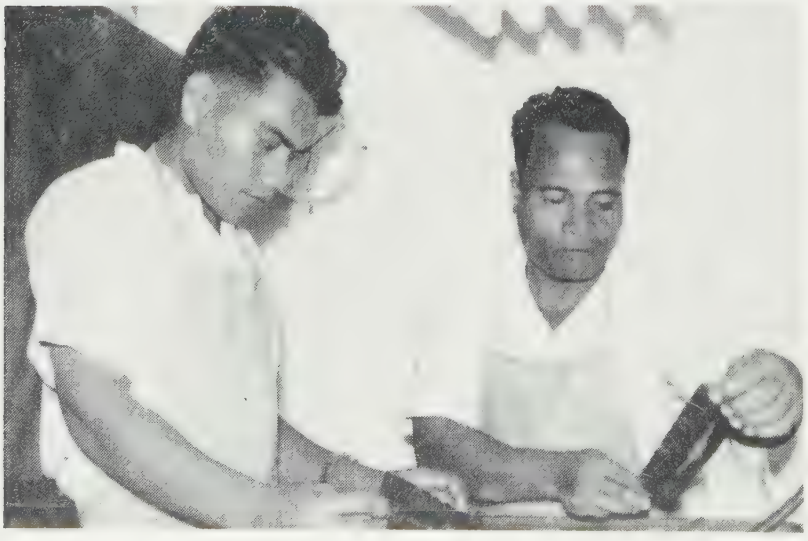
* Mr. Marriott is Editorial/Administrative Officer in charge of the project.

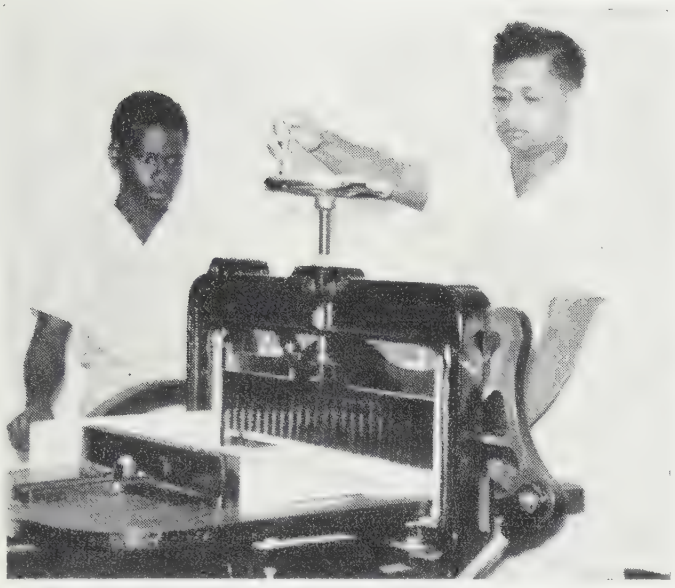
The Printing Machines

We usually begin the tour with the actual printing, though this is practically the last step in production. The Multilith 1250 offset duplicator is being operated by two young men from Netherlands New Guinea—Herman and Jason. Though their English has improved considerably since they came to Honiara we will have to call our Dutch Technical Officer, Mr. Koenen, to help them in a conversation.

They are printing a five-sheet monthly magazine for the Methodist Mission, which we undertake on a commercial basis. Jason is making a fine adjustment to the paper feed, while Herman is watching the ink supply. They have to get an 1100 run from paper plates that are guaranteed by the makers for only 500, but they can do this if they are careful to ink up the plate well before printing, to wash it carefully and no more than necessary, and to get the press-

Below: Tawita Bineati and Teroroko Tekaotioti masking a negative on the printing-down frame. Right: Guy Lepigeon opaquing a negative on the light box.





John Lawry and John Baker cutting paper on the guillotine.

Right: Tabare Toma preparing "copy" on the IBM electric typewriter.

Right: Martial Poggi ruling up a duplimat on the drawing board.

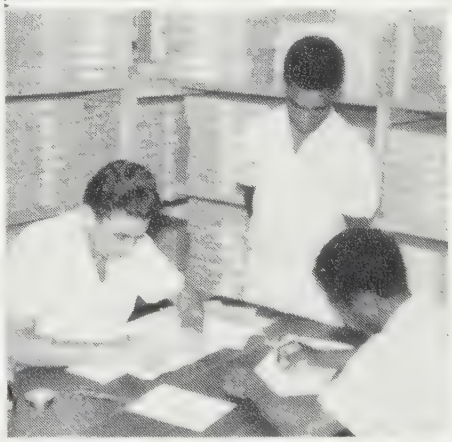
ure just right. We check one of the printed sheets and see that they have got the margins straight and balanced, and the reverse side coinciding nicely.

At the Rotaprint alongside, Cyril from Papua is assisting Francis, who was a BSIP trainee last year and is now employed by the BSIP Government. Francis is in charge of this machine, and each day has a trainee to help him and be instructed. We find it best in the first few months of a course to keep the trainees on two separate rosters for the two machines, to avoid confusion between the different sets of solutions and methods. Cyril washes the plate and blanket as Francis checks the first impression of a new run. Clumsy washing would weaken the image on the plate, requiring it to be typed again, and as this is a page of tables from the BSIP Population Census Report, the typist would not be happy to have to do it again. We try to give beginners metal plates to start with, as the image on them is much stronger than on paper plates.

Collating And Paper-Cutting Sections

On the far side of the printing machines is a long table used for both collating and for placing stacks of paper as they are cut on the guillotine. John Baker from Papua and John Lawry from the Solomons are cutting 10,000 sheets of Bank 22 paper, 7″ x 13½″, from stocks measuring 21″ x 33″. They must cut it accurate to a thirty-second of an inch as this job is for books of invoices in duplicate and triplicate. They must also take care that the corners are perfectly square (or the paper would not feed straight into the press), and that the length of the sheets is cut along the grain of the paper (or it would wrap around the blanket cylinder as it fed through the machine). They must calculate how many more sheets they will need, count the sheets quickly and accurately (rolling five off at a time by the thumb), and when it is cut to size, stack it neatly in reams for the pressmen. John Lawry was a schoolboy last year, but "Big John"—as we call John Baker—was in charge of an office duplicating section in Port Moresby, and knows how to handle paper and how to get a job done in a business-like way.

We insist on high standards of neatness and accuracy and always doing the best job possible, even if it seems rather humdrum and tedious. Printery discipline is important, too, as we have in the past suffered too much loss of time, materials and labour through someone idly changing the focus on the camera,



Guy Lepigeon, Jason Makabori, and John Lawry pasting up a display page.

or picking up a sheet of printed paper from a stack and replacing it upside down, or on a different stack.

Through an archway from the guillotine is the store room, where our paper stocks are stored on open racks. The trainees learn early to recognize bank, bond and MF papers, how to test for direction of grain, and the various uses for these different papers. We also keep stocks of cover papers, boards, art paper and a high-quality offset paper which is very suitable for presentation certificates (the numerous courses held in the Solomons benefit from these).

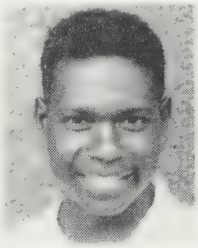
Camera And Darkrooms

The camera and darkrooms adjoin the machining room. Here we find some trainees working on negatives that were made on the process camera yesterday. Lepigeon from New Caledonia, who has

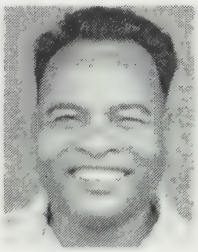
Samuel Irofufuli making some preliminary sketches for an illustrated book.

Samuel Irofufuli.

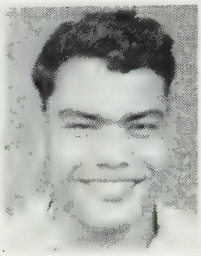
Tabare Toma.



John Lawry.



Teroroko Tekaotioti.



Tawita Bineati.

Trainees Attending 1961 Literature Production Course

BRITISH SOLOMON ISLANDS

SAMUEL IROFUFULI, 18, single, of Malaita, came straight from King George VI School, where he had passed second year of secondary studies. He has always been interested in art, and had heard of possibilities of employment as a book illustrator in the BSIP Government Printery. At the Centre he has specialized in art work and the paste-up of copy for the camera, and he is also interested in the operation of the latter and the machines. The work here has come up to his expectations, and his ambition is to continue with it in the BSIP Government Printery.

TABARE TOMA, 27, married, was born in Arorae, Gilbert Islands, and is a trainee sponsored by the BSIP Government. He passed Std. 7 at the Government Primary School, Ocean Island, and then learnt typing and worked for nearly four years in the British Phosphate Commission typing pool, Ocean Island. He moved to Tarawa and worked for the Government for nine years before transferring to Honiara, where he was employed as a typist in the Western Pacific High Commission Secretariat. The BSIP Government then selected him for training at the Centre. He prefers typing to other work here, and is most interested in the preparation of books. He will continue with this work in the Government Printery after completing his Course.

JOHN WESLEY LAWRY, 19, single, of Shortland Islands, came straight from Bilua Methodist High School, where he had passed Std. 8. He was selected by his Mission to attend the Centre, and has now formed the ambition to be a printer. He finds all the work interesting, especially the camera work and paste-up of copy. He would like to work in the BSIP Government Printery as a machinist until his Mission sets up its own offset printery, but he recognizes the need to have some friends trained with him to help him with the work in the Mission Press.

GILBERT AND ELLICE ISLANDS

TEROROKO TEKAOTIOTI, 42, married, comes from Nikunau in the Gilbert Islands where he worked in the London Missionary Society Printery for many years as both a compositor and machinist. He is also a pastor in the Society. He is very impressed with the offset method of printing, and finds particular interest in the typing of copy as well as the operation of the machines. He enjoys all the work, but considers a year is not long enough to learn as much as he would like to. After his Course he will return to the LMS Printery in the Gilberts, where he hopes an offset machine will soon be installed.

TAWITA BINEATI, 20, single, comes from Tabiteuea in the Gilbert Islands. After passing the highest class in Rongorongo LMS School he worked for a year in the LMS Printery as both a machinist and compositor. He finds offset printing much more interesting and adaptable than letterpress, and is particularly impressed with the process camera, on which he likes working best of all. He has made many friends in Honiara and enjoys the life here. On completing the Course he will work in the LMS Printery in the Gilberts. He hopes an offset press will be ready for him, and is looking forward to printing illustrated books in several colours.

NETHERLANDS NEW GUINEA

HERMAN PULANDA, 21, single, of Aiapo village, near Hollandia, was working for three years on letterpress in the Government Printery. He had experience in both machining and composing. Before that he was a hospital dresser for six years, in which occupation he received most of his education, having had only three years of formal schooling before that. He is impressed with the advantages of offset printing, and likes to operate the machines, especially when a book is being printed. On completing his Course he will return to the Government Printery, Hollandia, and hopes to help install and operate the offset machine waiting there.

JASON MAKABORI, 19, single, comes from Japen Island. He was for one year a machine operator in the Government Printery, Hollandia, and before that for six years in the Technical College. He attended primary school for six years. He likes the work of the Centre, but finds much of it quite hard to learn in one year. His chief interest is in the operation of the process camera and the offset machines. He will return at the end of the Course to the Government Printery in Hollandia, where he hopes to work on offset printing.

NEW CALEDONIA

GUY LEPIGEON, 29, single, comes from Nouméa, where he worked for two years as a bookbinder and had a little experience with offset printing. Prior to that he had been an electrician for eight years. He completed his schooling in Nouméa with the *Certificat d'Etudes Primaires*. He finds the operation of the offset machines and the process camera the most interesting aspects of the work here. He says that life in Honiara has its difficulties on the culinary side, but he has made some good friends. On his return to Nouméa he will be employed in the offset printing of official news bulletins.

MARTIAL POGGI, 25, single, was an electrician for four years and in the French Army in France for three years before coming to the Centre. He comes from Nouméa, where he completed his schooling with the *Certificat d'Etudes Primaires*. His preference in work is for offset-machine and camera operation, but he also enjoys doing the paste-up of copy for the camera. He finds printing forms just as interesting as

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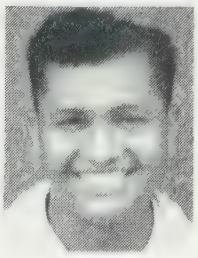
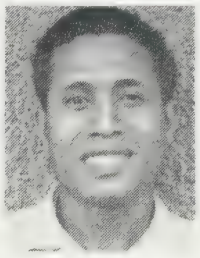
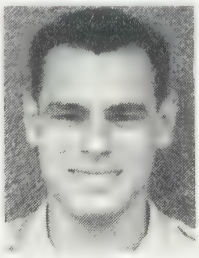


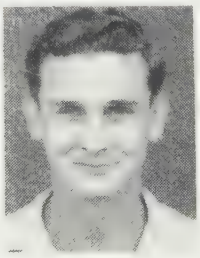
Herman Pulanda.



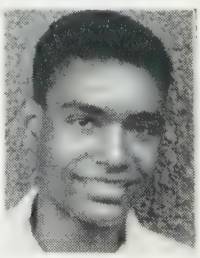
Jason Makabori.



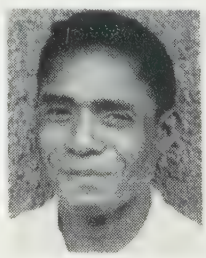
Guy Lepigeon.



Martial Poggi.



Cyril Nogah.



John Baker.

(*Continued from opposite page*)

printing books. He considers the Course a little short for complete training, as there is so much to learn. When he returns to Nouméa he expects to be employed by the Government in the offset printing of official news bulletins.

PAPUA AND NEW GUINEA

CYRIL NOGAH, 25, single, of Goodenough Island, Papua, came straight from St. Mary's School, Sideia, where he was in Std. 9 and passed the Queensland sub-Junior Exam in English and Latin. He had thought of becoming a teacher, but on hearing a school's broadcast about this Centre, and then reading about it in the *SPC Bulletin*, he formed an ambition to become a printer. Now that he is a trainee at the Centre he is not disappointed. He finds the most interesting part of the Course is the operation of the printing machines. When he finishes at Honiara he hopes to find employment as an offset printer with Extension Services in Papua and New Guinea.

JOHN BAKER, 26, single, of Yule Island, Papua, was in charge of the duplicating room of the Department of Civil Affairs, Port Moresby. Previously he had been shipping clerk for five years in the Government Stores, Port Moresby. He received his schooling at De La Salle College, Yule Island, where he reached Std. 6. He finds all aspects of the work at the Centre interesting, especially the camera work and preparation of copy for the camera. His ambition after the Course is to gain further experience in offset printing, preferably in Australia, and then to instruct in it in Extension Services, Papua and New Guinea.

had previous experience as a bookbinder, is opaquing a negative on the light box. This is fine and exacting work, for he must not only opaque all the pin holes and guide lines on the negative, but be careful to leave details that are needed, such as fold lines, and the register marks for colour work. Intelligence is needed as well as concentration and a steady hand.

Teroroko and Tawita, both from the Gilbert Islands, are printing down from negatives onto pre-sensitized aluminium plates, which are placed in a vacuum frame under a fluorescent light. Both these trainees had previous experience on letterpress, but are very keen on this new medium. They will make a two-man team, with Tawita specializing on copy preparation and Teroroko on the machining. The job they are now doing is the cover design of the *Careers* book. This is to be printed in two colours, but the two plates can be made from the one negative of the whole layout by masking off what is not wanted on each plate. Care must be taken in lining up the negative on the plate and in masking off. It saves time on the press, too, if the two plates are made with the negative in exactly the same position on each plate. We once printed a book with half the page numbers missing as they had been accidentally masked off; and it is not unknown for a negative to be placed upside down, giving a mirror-image print, but so far this mistake has always been spotted before going to press.

After exposure to the light for the correct time, the light and vacuum pump are switched off, the frame is opened, and the plate removed to have process gum applied and to be briskly and evenly rubbed with image developer. When, in a few seconds, the image appears, the plate is washed and then carefully examined for any faults or poor development.

Copy Preparation Room

We have been following the production line backwards, and now we come to the copy preparation room. It is here that we find something of a bottleneck, as very few of the trainees come to us as competent typists, and though we provide regular practice for all of them, twelve months is generally not long enough in which to learn touch-typing reliably and to gain a sense of layout. The trainees might be fair typists by the time they leave us, but, unless they are already skilled, we have found that we cannot expect any useful work from them during their training period.

Educational level and language impose another difficulty, for good copy-typing and proof-reading demand high standards of spelling, grammar and general knowledge (clairvoyance, too, with some of the copy that comes in). The trainees find the machining side of the training programme more within their grasp, and there is a full-time job in learning this alone. To keep the presses rolling, we are glad to print work supplied by BSIP Government typists, and commercial forms for which we can make a photographic plate and run off repeat orders as they are wanted.

However, we manage to produce a little book of our own every now and then, and Tabare, a Gilbertese employed by the BSIP Government and now one of our trainees, is here typing the pages of *Six Papuan Fables* on the IBM electric typewriter. Tabare has been employed for a good many years as a typist and is very accurate. He was very pleased to be able to use this machine, as with its proportional letter spacing and means of justifying the right-hand margin, it gives a very finished appearance.

At the drawing board, Poggi from New Caledonia is ruling the guide lines on a stack of duplimats for typing *The Needle* (the BSIP medical newsletter, which we print in the form of a 28-page magazine, with drawings and half-tone reproductions). This is rather humdrum work for Poggi, who has a very good eye for layout, and is quick and accurate; but the humdrum jobs have to be done along with the more interesting ones. We have found that the only foolproof way of ruling up guide lines and all layouts is on the drawing board with T-square and set-square. This year we have bought some additional drawing boards so that there is always one available for exercises and any little occasional job. We try to make it a habit to use the correct instruments rather than guessing or going by the edge of the paper.

In the art corner, Sam (Solomons) is working on some preliminary sketches for the illustrations of a supplementary reader of Solomon Island stories. We cannot give him any special art training, beyond letting him see for himself what sort of drawings are successful when printed by offset and what are not, but he is doing a commercial art course by correspondence. After his preliminary sketch is accepted by the editorial officer, he makes a finished drawing, either with pen and ink on paper for the camera, or direct onto a paper plate; and he then follows his work through to the final printed product. Not all Sam's time is spent on illustrating: he also sets up display lines, such as on the Varigraph, and works in the camera room. Both he and Tabare are the two who specialize on copy preparation.

Our training methods have been modified since the first course, when we attempted more than most trainees could manage, especially on the copy-preparation side. We now concentrate much more on the printing and paper-handling side of the work, aiming to produce good tradesmen who can at least be relied on to print well what others write, edit, illustrate and prepare. From the work you have seen them doing, I am sure you will agree that there is plenty to learn, and that they are doing a good job.

Equipment Standing Up Well

All of our equipment, in use now for eighteen months, is standing up well. There have been a few minor breakages, but these were soon repaired. The printing presses are stripped down, cleaned and oiled every Saturday. The electric typewriters and camera have given no trouble at all, thanks, no doubt, to being in an air-conditioned building, which also excludes the dust and insects. Without air-conditioning we should by now have had fungus growing on the camera lenses and have had to ship the electric typewriters to Australia for overhauls, apart from the difficulties with the offset printing process in wet weather and the storage of photographic materials.

(Continued on page 53)

Group photograph taken after the Conference was formally opened by the Acting Governor of Netherlands New Guinea, Mr. A. Boendermaker.

Front row: (seated) Dr. M. Postiglione, Dr. J. J. Saave, Mr. A. Boendermaker, Dr. G. Hoekstra (Director of Public Health, Netherlands New Guinea), Dr. J. D. Macgregor.

Back row: (standing) Mr. C. Reinders Former (Governor's A.D.C.), Mr. R. Slooff, Dr. W. J. O. M. van Dijk, Mrs. M. Grauenkamp (Secretary), Dr. J. H. E. Th. Meuwissen, Dr. O. Kranendonk, Mr. van Os, Mr. R. Hennell.

Malaria Experts Meet In Hollandia

The Second Inter-Territory Malaria Conference for the South-West Pacific was held in Hollandia, Netherlands New Guinea, from July 31-August 5. The purpose and recommendations of the Conference are briefly reviewed below.

By R. SLOOFF

IN the fight against malaria, close co-operation between neighbour countries is essential. This is especially so if the epidemiology of malaria in such countries is related and the natural conditions encountered are of the same kind, as in the south-west Pacific region.

A few years ago, the departments of public health in this area decided to organize regular inter-territorial malaria conferences. The first was held at Port Moresby in October, 1959. Malaria workers from all over the region attended the meeting to exchange experiences, to discuss the many common problems, and to recommend the next steps to be undertaken in the fight against public health enemy number one, malaria.

The Second Inter-Territory Malaria Conference for the South-West Pacific was held in Hollandia from July 31 to August 5 last, under the chairmanship of Dr. O. Kranendonk, Deputy Director of Public Health, Netherlands New Guinea. Delegates from the region were:

DR. J. D. MACGREGOR, Chief Medical Officer, British Solomon Islands Protectorate.

DR. J. J. SAAVE, Acting Specialist Medical Officer Malariology, Papua and New Guinea.

MR. R. HENNELL, Malaria Control Assistant, Field Supervisor, Papua and New Guinea.

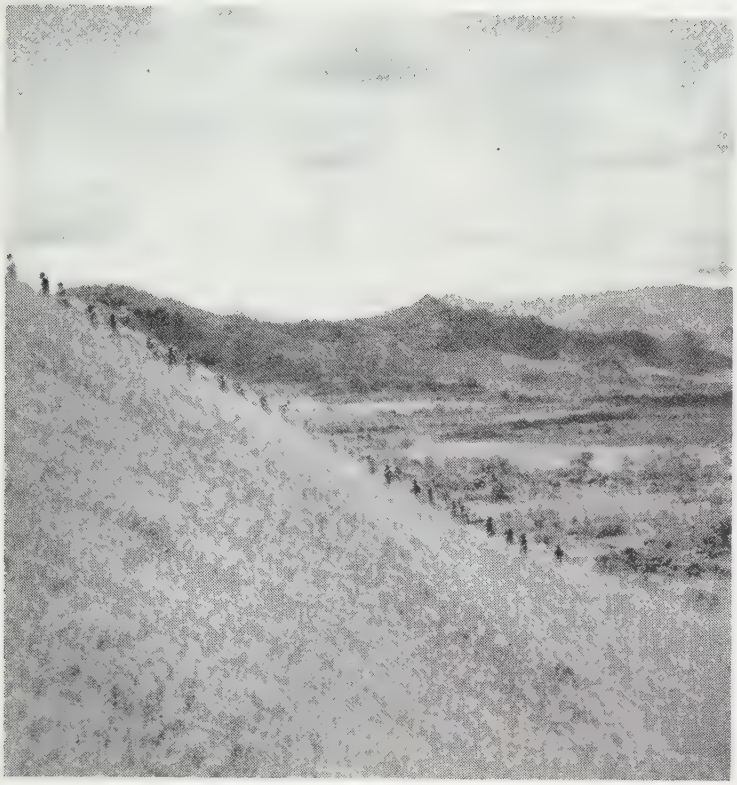
DR. W. J. O. M. VAN DIJK, Senior Malariologist, Netherlands New Guinea.

DR. J. H. E. TH. MEUWISSEN, Malariologist, Netherlands New Guinea.

MR. R. SLOOFF, Entomologist, Netherlands New Guinea.

(Continued on page 68)

Below: Anti-malaria workers filling a spray pump with DDT emulsion. Right: When population coverage is complete, tablet campaigns are highly successful.



Above: An agricultural patrol leaving the Waghi valley in the Western Highlands of New Guinea to visit village farmers in the mountains. Right: An indigenous assistant checking progress of a farmer's cacao trees in the Northern District of Papua.

Agricultural Extension Work In Papua And New Guinea

The objectives, organization and methods of the agricultural extension service operated in Papua and New Guinea by the Department of Agriculture, Stock and Fisheries, is described in the article below. It is of special interest in view of the regional agricultural extension meeting that will be held under South Pacific Commission auspices at Rabaul in November next.

By W. L. CONROY*

IN the years since World War II, the Administration of Papua and New Guinea has developed a major agricultural extension service within its Department of Agriculture, Stock and Fisheries. Starting in the immediate post-war years with a handful of men whose first task was rural rehabilitation in the war-ravaged areas, the service has grown to the point where it now reaches out to all parts of the territory.

It employs over one hundred professionally-qualified extension officers, who are supported by three hundred indigenous intermediaries and various officers engaged in specialised activities in fields such as crop processing and marketing, agricultural training, quality control and mechanical equipment services.

Policy And Objectives

The need to achieve a general expansion and commercialisation of indigenous agriculture, which had been stressed by former Australian administrators such as Sir Hubert Murray, has received new emphasis in the post-World War II period. The present Minister for Territories, the Hon. Paul Hasluck, has stated that the advancement of indigenous agriculture is in the forefront of the Australian Government's policy for the territory, and the Administration has undertaken the major expansion of agricultural extension services referred to above.

Policy in the territory fully recognises the valuable contribution to the economy made by immigrant agricultural enterprises, not only by increasing the total volume of exports and locally-consumed products, but also by the introduction of capital, and the ingredients of managerial skill and specialised knowledge of particular industries. The impetus given by such enterprises to crop processing and transport arrangements is also important, while—particularly when immigrant settlement is suitably dispersed—the well-managed estate or farm serves as a constant demonstration to the surrounding indigenous farmers, and in fact often provides them with an ultimate target for their own efforts at improvement and expansion. Agricultural extension officers in the territory, therefore, maintain regular contact with members of the immigrant farming and planting

* Chief of the Division of Extension and Marketing, Department of Agriculture, Stock and Fisheries, Papua and New Guinea.

An extension officer points out aspects of cacao tree development on a farmer's plot in the Gazelle Peninsula area of New Britain.

community. However, inevitably their activities are mainly centred on assistance to indigenous producers, and policies and programmes are customarily stated in terms of the needs and potentialities of this group.

Put succinctly, the policy of the Australian Government in this field is to stimulate advancement to a modern economy as rapidly as possible, while recognising the need to maintain good social order and voluntary acceptance of the economic and social changes which are involved. The stress on voluntary acceptance of change presupposes an effective extension organisation.

An important statement of objectives and measures to achieve them, which is applicable to the whole of Papua and New Guinea, was made in the 1958-1959 Annual Report on the Trust Territory of New Guinea to the General Assembly of the United Nations, as follows[1]:

" . . . The aims of the extension programme, which have been re-stated during the year, are as follows:

(a) To raise the level of subsistence in the villages by—

  (i) improving the nutritional value of the foods eaten;
  (ii) introducing new foods; and
  (iii) ensuring a year-round supply of food.

(b) To introduce the economic means of supporting a higher standard of living by—

  (i) introducing crops and stock suitable for production for sale having regard to the situation and circumstances of each village;
  (ii) assisting in the disposal of produce;
  (iii) introducing where necessary the plant and equipment for the processing, storing and marketing of such produce; and
  (iv) educating the village people in technical and commercial procedures.

(c) To assist in bringing about the optimum use of the agricultural (including pastoral) resources of the Territory and to contribute to an increase in agricultural production in the Territory.

(d) To contribute to the educational advancement of the people both by technical training and by a change in their interests and outlook.

(e) In serving the above aims to improve the methods of indigenous agriculture including methods of selecting, clearing, enclosing and cultivating land, the rotation of crops, the use of better implements, animal husbandry, fish farming, poultry raising and all farm and garden practice.

"The following are mentioned as examples of the practical measures being demonstrated to serve the above-mentioned objectives :

(a) The use of higher-yielding varieties and varieties resistant to drought, pests and diseases and suited to the local environment, as a means of increasing production from the crops normally grown at present;

(b) diversification and improvement of agriculture by the substitution of increasingly efficient crop rotations or standard plantings of tree crops and other perennials for the present subsistence systems;

(c) the proper use of livestock as appropriate, including the integration of stock and crop farming;

(d) education and provision of marketing facilities to show how surplus production, both from traditional subsistence methods and increases brought about by the adoption of improved farming techniques, can be turned into cash for the purchase of consumer goods and labour-saving equipment and how specialised cash crops (and appropriate livestock) can be grown to further increase cash income;

(e) education of the indigenous farming community in the importance of quality and proper grading in commercial agriculture production;

(f) assistance to and co-operation with other Administration departments towards organising the indigenous land system so that the individuals' land is consolidated into contiguous areas, and so that farming land can be held under permanent tenure in blocks of a size appropriate to the type of farming practised and in keeping with managerial efficiency;

(g) reaching as many farmers as possible, to teach them improved farming techniques, appropriate to local environments, by the conduct of courses at appropriate centres;

(h) introduction of new implements, plant and equipment according to the capacity of the people to use them economically."

This necessarily long quotation is important, in that proposals for change are made against the background of the traditional system of primitive agriculture, while the implications such as the need for processing and marketing arrangements and land-tenure changes are given full recognition. The following aspects are particularly worthy of note:

(1) The economic importance of traditional subsistence agriculture is given full weight.

(2) Traditional subsistence agriculture

is recognised as a valid system of land use. A fundamental technical decision is required in such cases as to whether traditional agriculture will be merely modified in progressive ways or completely replaced. In fact, in Papua and New Guinea, agricultural surveys have revealed so much that is valuable and conservational in traditional agriculture, that the emphasis in agricultural extension work has been on the modification of the primitive system, while retaining its essential features (of which the outstanding and universal one is planned rotational use of land).

Dr. Barrau's painstaking surveys of Melanesian agriculture[2] have been most useful in developing a systematic approach to traditional land-use practices, and to date are the only significant published work on this subject. A wealth of information is contained in patrol reports of the Department of Agriculture, Stock and Fisheries, and the Department now maintains a continuous territory-wide survey of the status of indigenous agriculture, which is based on assessment of the extent of modification effected of the traditional system.

(3) Full appreciation is shown of the need to develop parallel arrangements for crop processing, quality control, and marketing in cases where extension programmes stimulate commercial developments either with existing or new crops. In 1960, the former Division of Extension was reorganised as the Division of Extension and Marketing with a special marketing section included, thus providing for a very close combination of the two functions.

Staff And Organization

The Agricultural Officer is the basic staff unit of the Division of Extension and Marketing, and as mentioned earlier, more than one hundred such officers are currently employed. All are required to be professionally qualified, and the great majority either have degrees in agricultural science from Australian Universities or diplomas of Australian Agricultural colleges. Graduates and diplomats of other universities and colleges with equivalent academic standards are also employed.

Since 1954 there has been deliberate concentration on the development of a force of indigenous intermediaries, both to augment the work of the professional officers and to facilitate and broaden contacts with the rural population. More than three hundred such intermediaries are now employed throughout the territory. They are invaluable in carrying out routine advisory tasks, providing follow-up services to agricultural patrols, and, in particular, providing informed assessments of the reactions of the rural population to agricultural changes.

A group of young farmers receiving instruction in triangle planting of coconuts at the Oriomo agricultural extension station in the Western District of Papua.

These men, designated as Agricultural Fieldworkers, have primarily practical qualifications derived from a course of repetitive-type training, and many have been absorbed about the middle-primary level of education. However, levels of both scholastic and technical education are rising, and numbers of these assisting intermediaries are entering the Auxiliary and Third Divisions of the Public Service as Agricultural Assistants and Assistant Agricultural Officers.

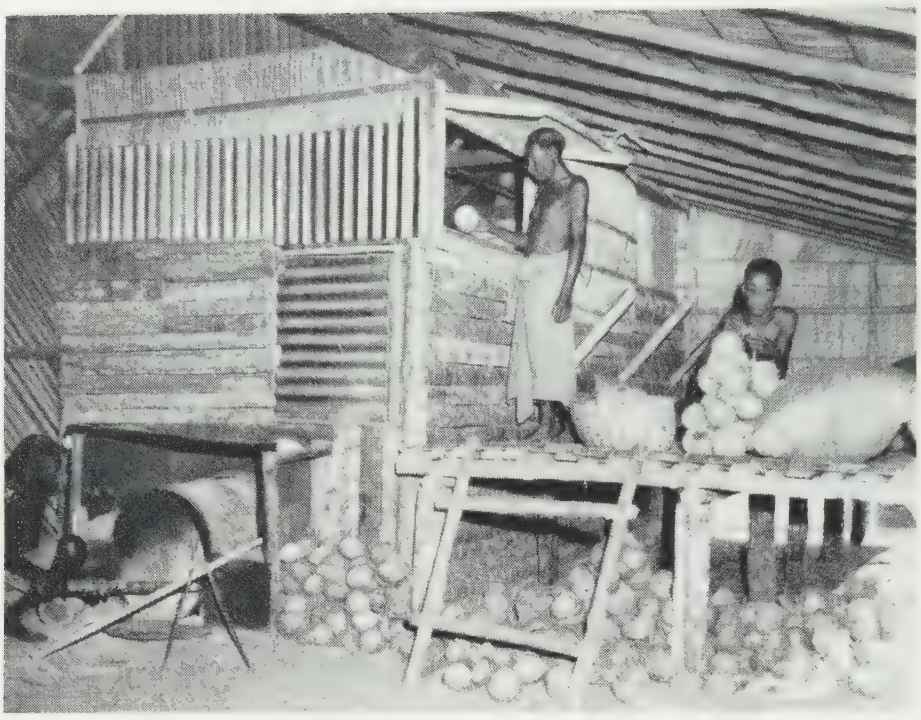
The taking from time to time of decisions as to the intensity of staffing which is aimed at is considered to be important in a programme which endeavours to reach all sections of the farming community. Such decisions must of necessity be fairly arbitrary, taking into account all available experience and an assessment of the effect of such factors as physical difficulties of climate and terrain, and the level of development and capacity for new advances of the rural population.

A current three-year programme (1959/60-1961/62) of the Division of Extension and Marketing which gives every indication of successful completion, aims to raise the intensity of staffing to one professional extension officer per 3,000 farm families, and one indigenous intermediary per 1,000 farm families. Further forward planning envisages raising the level of professional staff to one per 2,000 farm families, and of intermediaries to one per 500 farm families. These levels are not of course rigidly applied in particular areas, but represent a mean intensity over the whole population. Generally it is found that there is always a demand for extension work, and that numbers of farmers, rather than the level of development, determine the intensity of extension staffing.

The Division has a small headquarters organisation within the headquarters of the Department comprising the Chief of Division, responsible directly to the departmental head, several senior and more experienced agricultural officers assisting the Chief of Division, and the heads of the specialised sections dealing with agricultural training, crop processing and marketing, and mechanical equipment.

In the field, the organisation of the Division parallels the general organisation of the Administration, and the field staff in each of the fifteen districts are divided into district groups, each under the control of a District Agricultural Officer located at the administrative headquarters of the district. The District Agricultural Officer, as well as being the head of the extension service in the district, as a matter of convenience also serves as departmental administrative representative in the district, and may be in direct contact with the chiefs of technical divisions and have the important function of maintaining liaison with the District Commissioner and other departments.

Regionalisation has been introduced as an essential alternative to further expansion of the Division headquarters, and regional organisations based on Rabaul, Lae, Goroka and Port Moresby, are provided for the New Guinea Islands, Northern Mainland, Central Highlands, and Papua. The regional agricultural officer has a considerable



A western Papuan producer displays his copra inside a well-built drier.

degree of local autonomy in directing staff and organising local programmes in accordance with approved policy. Finance devolves through the regional agricultural officer, and most importantly he serves as a point of reference for policy to outlying areas, where contact with the territorial headquarters becomes tenuous from time to time.

Apart from the training section, the other specialised sections lend project managers (for processing and marketing projects), produce inspectors and mechanical equipment officers to the district extension staffs, where they come under the control of the regional or district agricultural officers.

A new concept recently applied is the formation and use of regional extension teams. These are small, mobile groups of agricultural officers directly responsible to a regional agricultural officer, which can be diverted at short notice to any area in a region where there is a sudden increase in demand for extension activity. Such unpredictable upsurges of demand are characteristic of an evolving situation such as we now have in the territory, and cannot as a rule be met within the normal framework of staff postings.

Farmer training and the training of agricultural field-workers, although supervised by the training section, are carried out as part of the normal duties of agricultural officers in the districts.

Working Methods

The basic technique of the Division of Extension and Marketing may be described as the application to the farming community of closely-integrated programmes of contact, demonstration and training which aim to effect desirable modifications of the systems of agriculture being practised.

Contact with the rural population is achieved in a variety of ways, and the use of intermediaries as described above is vitally important in this sphere. Care is taken, however, to ensure that they do not become interposed between the farmers and the professional agricultural officer, cutting the latter off from personal contact with the community.

Under territory conditions of terrain and communications, the agricultural patrol in which an officer and assistants move slowly through an area from village to village—staying in each village to advise, discuss problems, and distribute seed and planting material—is still a vitally-important form of contact, and many such patrols are conducted. In 1959-60, 601 patrols provided contacts with a total rural population of 640,000.

Rural organisations such as co-operatives, rural progress societies, village agricultural committees and associations, and agricultural sub-committees of local government councils are also widely used for the purposes of contacting rural producers.

Marketing organizations, besides their importance in providing outlets for produce resulting from development programmes, are a valuable form of contact. The project manager assigned to supervision of an area crop processing and marketing project, and the agricultural officers working with him, gain valuable contacts and increase their authority through the services they provide to the farmers concerned.

Eleven Main Agricultural Extension Stations

The framework from which extension activities are conducted is provided by a chain of eleven major agricultural extension stations distributed throughout the territory. These stations carry out approved crop production and animal husbandry programmes, and conduct the farmer-training courses now being provided for 750 trainees per year.

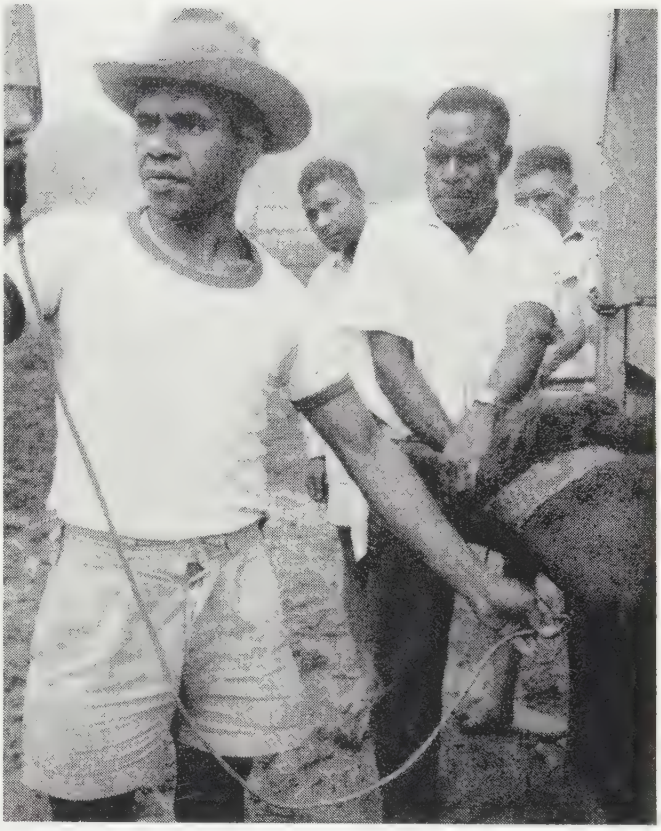
Research and investigational work is largely conducted at separate experiment stations of the Divisions of Plant and Animal Industry. The importance which backward rural producers attach to the static demonstrations provided at these stations has to be seen to be fully appreciated. Over and above the organised farmer-training courses conducted, many producers make short-term visits to these stations to check on techniques of crop or stock husbandry and discuss problems encountered in their local areas.

Agricultural extension centres are smaller establishments usually found at the sub-district or area level and are much more widespread than the extension stations. Primarily they are a base and living area for one or more agricultural officers, their assistants, and a few trainees. Some minor crop or stock demonstrations appropriate to the area may be provided, and facilities for the storage and distribution of seed are usually found. Their function is primarily one of contact.

While the training section of the Division of Extension has programmes planned for all levels of training up to full diploma standard, the farmer-training scheme is seen as being of the greatest immediate importance to current extension programmes. The selection of groups of young men for farmer-training courses provides a valuable strengthening of the links with newly-contacted rural communities, while new crop and stock programmes in more developed areas are given powerful support by appropriate farmer-training courses.

Achievements

Substantial achievements can be attributed to the policy and programmes outlined above. Immediately obvious are the increases in production of major cash crops. For 1960-61, the output of commercial crops by indigenous producers included 26,000 tons of copra, 2,000 tons of cocoa, 1,200 tons of coffee, 12,000 tons of truck crops and 500 tons of passion fruit. Peanuts, rice, tobacco and castor-seed were also produced. Commercial production of rubber by indigenes is in its infancy, but is firmly established.



Above: Primitive producers in the Central Highlands of New Guinea selling farm produce for cash.

Right: Local farmers watching treatment of cattle at an agricultural station in the New Guinea Highlands.

Less obvious—but equally important—is the maintenance and strengthening of subsistence agriculture that has taken place. The major local crop staples still flourish, and are frequently cultivated for commercial sale as well as domestic use, while many new food crops have been added to the subsistence regime. Valuable traditional practices such as the rehabilitation of garden land by *Casuarina* planting practised in the Chimbu area have been widely extended.

The impact of the extension organisation and its methods, described above, is beginning to be felt, and no doubt these achievements will be dwarfed by future levels of gross production, and left far behind by new levels of efficiency and technical competence among the farmers.

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Coconut Development Scheme In U.S. Trust Territory

On July 14 Mr. V. D. Stace, SPC economist, returned to headquarters from Guam and the United States Trust Territory of the Pacific Islands, where he had spent five weeks continuing his survey of capital formation in the Pacific.

Among the agricultural extension activities that he studied during his visit, Mr. Stace was particularly impressed by progress being made both in establishing a cocoa industry based on small-scale native plantations, and in implementing a long-range scheme, begun in 1958, for the rehabilitation and replanting of coconut plantations. Under this scheme, seednuts are purchased by the Administration from Yap and other areas where high-producing palms are available. These seednuts are distributed throughout various districts of the territory where numerous small nurseries are maintained, usually under the immediate control of members of the Micronesian field staff of the Department of Agriculture.

In the Ponape district, for example, some eighty nurseries are at present maintained in widely-distributed locations, with a total capacity of nearly 100,000 seednuts. From such nurseries, selected young coconut palms are made available without charge to Micronesian landowners who are willing to rehabilitate and replant typhoon-damaged, aged or overcrowded plantation areas, or to develop new areas in accordance with recommended practices.

Symposium On Improvement Of Tropical Crops

Because there is an urgent need to improve coconut production in the main producing areas throughout the world, a proposal has been made that a survey should be carried out immediately of coconut palm varieties, to enable breeding programmes to be stepped up.

The proposal is embodied in a resolution passed at a symposium on the improvement of tropical crops held at Honolulu on August 23 and 24 during the Tenth Pacific Science Congress. It was organized by Dr. Jacques Barrau, SPC executive officer for economic development, and was attended by tropical crop specialists from many parts of the world.

At the symposium, papers were presented on the genetic improvement of the coconut palm, its agronomy in general, the very serious problems of the *cadang-cadang* disease of the coconut palm in the Philippines, plant exploration and introduction as a basis for improving tropical crops, and the improvement of some subsistence crops in the Pacific.

1961 LPTC Trainees At Work

(Continued from page 47)

Only one piece of equipment has proved inadequate, and that is the process camera—the cheapest available—when used for half-tones. The voltage of the electricity supply varies too much to determine consistent exposure times, and the film-holder does not work very well. We had a suction-operated film-holder made in Sydney, but as this proved no more successful than the first, we got the local PWD workshop to construct one to Mr. Koenen's own design, and at last are meeting with some success.

The women's committee which worked to produce a fine stand at the recent Commonwealth Technical Training Week Exhibition in Suva.

Fiji Women Find New Interests

Fiji women are responding enthusiastically to organized activities involving them in new interests outside the home, as this article by the Women's Interests Officer for the Colony reveals.

By RUTH ROBERTSON

IN our work in the women's interests field, one often hears comments such as — "Oh, yes, anything new will bring forth enthusiasm, but it won't last. No island people will maintain a solid interest, and you are just wasting your time."

Sometimes when the going is hard one is inclined to recall these things, and to wonder whether in fact the people who make such statements are not wiser in remaining outside. At other times, however, it is abundantly clear that the response to relatively small efforts is so great that the limiting factor lies, not with the island people, but with those of us who are endeavouring to guide them along lines which will fit them to deal with the world of the twentieth century, complete with all the problems which easy communication brings.

One has only to run through the letters which daily reach the Women's Interests Office, each asking for help for a newly-established club, to realise that these women are eager to learn. Frequently the new club results from broadcast reports of club activities; from someone who has been to an area where clubs exist and has had first-hand contact with one which has developed a full programme; from a district nurse who has seen the extent to which such activities will contribute to the effectiveness of her work; from a schoolteacher who recognises the importance of bringing home and school together; from a man who wants his wife to have the opportunities he sees women in other areas enjoying; from government officials who see the economic value in women establishing centres of learning.

In very many cases the request is vague, such as—"We want to have a club, will you help us?"; in others it is well formulated—"We have started our club but we do not know how to sew. Will someone from your Office come and help us?"

Because of the limitations which are imposed, firstly by a staff of three for the whole Colony, and secondly, by transport difficulties over such a widely-scattered area, it becomes evident that some system of de-centralisation and development of the capacity of voluntary workers—especially those who have had previous experience and opportunity —must be concentrated upon. With

At the Exhibition, demonstrations were given of Chinese embroidery and cooking.

Mistress Lusiana Duacakacaka and Miss Robertson, Women's Interests Office staff (at rear), teaching basic processes to sewing leaders from the Suva-Nausori area.

this in mind, district leaders chosen by the advisory committee for the area have come into Suva for six- to ten-day training courses, not only in club organisation but in such things as sewing, nutrition and cooking, gardening, handcrafts, and health. Many of these women, on returning home, have assisted with training courses for their club leaders in the area.

Frequently the advisory committee has found it necessary to seek the assistance of the Women's Interests Office staff in determining a programme, and in actually carrying it out. But the important thing is that the responsibility rests with the advisory committee in the area to organise the course, and the request has, of course, emanated from the area concerned, thereby filling two of the primary demands in ensuring continuity of the work.

There is *never* any difficulty in getting the women to attend for training; rather is the problem one of reducing numbers to manageable proportions. For example, one Committee finally decided it could work more effectively if the district were divided in two. In order to maintain unity it was decided that those in the centre would attend the monthly day-training course at each end of the district. Theoretically they should have sixteen sewing and cooking leaders, but in fact thirty-four turn up. The cooking leaders, incidentally, prepare the lunch for the whole group, and they all find great difficulty in finishing their work before the last bus leaves.

This particular Committee has worked out the following leaders' training programme:

JULY—*PRE-SCHOOL CHILD:*

SEWING: Playsuits, revision of patchwork for bed covers.

COOKING: Milk pudding, coconut slice.

CHILD CARE: Demonstration of toys and occupations for pre-school children, with a talk on daily routine.

AUGUST—*SCHOOL CHILDREN:*

SEWING: Girls' uniforms.

COOKING: Samples of suitable school lunches.

CHILD CARE: Talk by visiting teacher on the ways in which the parents can assist the school.

SEPTEMBER—*SCHOOL CHILDREN* (ctd.):

SEWING: Tailored shorts; revision of shirts (already covered in previous course).

COOKING: Planning balanced meal for school children, and preparation of a suitable evening meal.

CHILD CARE: Talk and discussion on routine for a child; making sure he can get to school on time.

OCTOBER—*OURSELVES:*

SEWING: Underwear.

COOKING: Requests.

GAMES AND AMUSEMENTS.

NOVEMBER/DECEMBER — *CHRISTMAS PROGRAMME:*

To be planned in detail later, but to include sweet-making, decorations, planning a children's party; presents for the family, etc.

The Committee is relying upon help from Europeans in the area to carry out this programme.

Technical Training Week Exhibition

In contrast to this programme devised by and for rural women—which undoubtedly provides something of interest for all the leaders—is an account of the recent activities in Suva of a multi-racial group called together by the Women's Interests Office in a purely *ad hoc* fashion.

The theme was "Education Today for Tomorrow". The Commonwealth Technical Training Week was just three weeks off when a request for the Women's Interests Office to take part in the exhibition was received. Commitments beyond Suva made it absolutely impossible for the Office to accept the responsibility for such a display. Time would not even permit of the assembling of suitable material, let alone making arrangements for suitable demonstrations to be carried out.

Accordingly, some fifteen women representing the major races and organisations in the community were asked to attend a meeting one week later to discuss the possibility of presenting women's activities. These women willingly took up the challenge, worked day and night to prepare an adequate stand, and finally involved an additional forty-eight women and several organisations such as Red Cross, St. John's Ambulance, etc., in presenting demonstrations at hourly intervals during the week of the Exhibition.

Subjects covered were mothercraft, home and flowers, gardening, sewing, home industries, nutrition and cooking, health and hygiene, first-aid and home nursing, school lunches, leisure-time activities, etc.

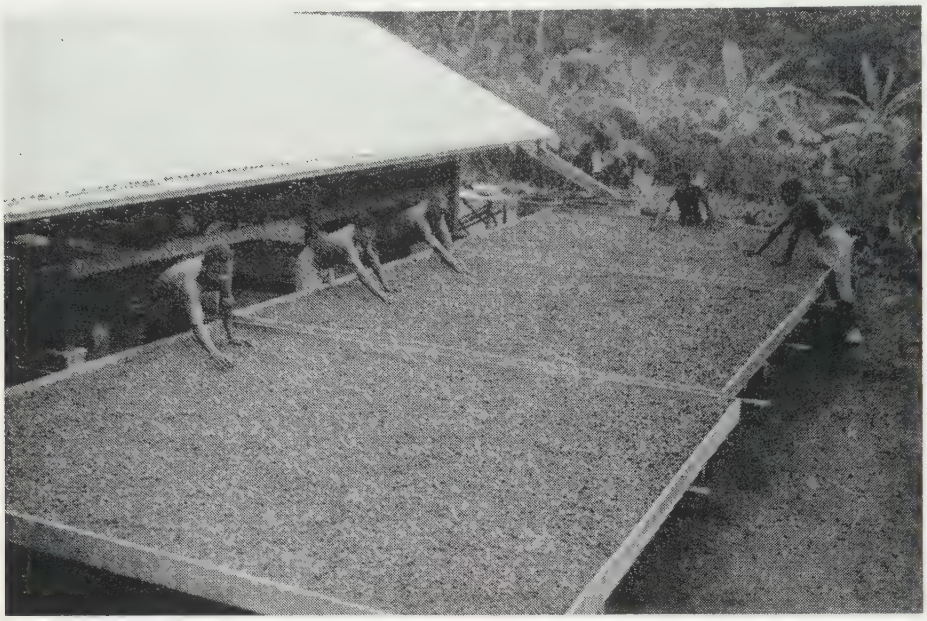
It was a constant source of gratification to many of the women as they worked together on the stand, to recall that this was the first time they had really combined in an all-out effort to produce material which showed the different cultural backgrounds, which would enhance the lives of people from different groups, and which would add to knowledge and understanding one of the other.

As the Exhibition developed, so did the interest of the women working to produce the demonstrations. As one found an Indian woman who made very beautiful dolls, and another who did fine beadwork, another thought of a woman who could demonstrate very fine Chinese embroidery, while yet another brought to mind a Fijian who could reveal the skill involved in *masi* making, and Europeans who could make reading matter live, and flowers talk.

Limits were imposed only by time and space available, and it was common to hear those on duty discussing the possibility of having an "all-women's exhibition, where we could have first-rate demonstrations of school lunches for all races, the actual preparation of soil for seed boxes, etc."

(Continued on page 62)

Processing Cocoa Beans For Quality



Factors which make for quality in the processing of cocoa beans are discussed in this practical article by a leading Pacific authority on the cocoa-growing industry . . . .

D. R. A. EDEN

Cocoa beans drying at a fermentary built and operated on a co-operative basis by native growers in the Gazelle Peninsula of New Britain. The trays are slid out from fixed racks under the roof.

IN a previous article* I emphasized the importance of some aspects of harvesting which have a direct bearing upon the ultimate quality of processed cocoa beans. These included the picking of only fully-ripened pods, the discarding of diseased beans, and the prevention of "washed" cocoa, which occurs when bags of green beans are left in the field for many hours exposed to heavy rain.

The term "processing" is understood to include fermenting, washing (which is optional), and drying.

Grading is a post-processing action performed either by hand or by machine, when the processed beans are sorted into standard sizes for marketing. Sizes include large or first-grade beans, medium to small or second-grade beans, nibs and flats. Nibs are broken fragments of bean cotyledons, while flats are "dud" beans without cotyledons at all. Nibs have a comparatively low sale value to the manufacturers of chocolate, while the flats are usually discarded as of no value, except for the making of theobromine and some forms of cattle cake.

The Fermenting House

When being built, a fermenting shed should be made strong and weatherproof. Most permanent fermenting boxes are built so that the walls of the building form the backs of the boxes. If there is a row of say ten standard-size boxes, and these are all filled with cocoa beans, there will be a total weight of 30,000 lbs. of wet cocoa to be supported by the flooring and box sides. The outward thrust of ten boxfuls of cocoa against a building wall is heavy indeed; strong posts and good staying are essential. A roof, too, which leaks into the fermenting beans may wash out the sugar content from the fruit pulp and so halt fermentation. The use of thatching or corrugated asbestos sheeting is recommended for roofing; both are resistant to corrosion by acetic acid fumes which rise from the fermenting cocoa.

Where many boxes are necessary, parallel lines of fermenting boxes are most favoured, with a 3′ 6″ passage between. Such a corridor should be floored with acid-resisting bricks and mortar, because the acid from ferment sweatings is highly corrosive and quickly destroys ordinary cement.

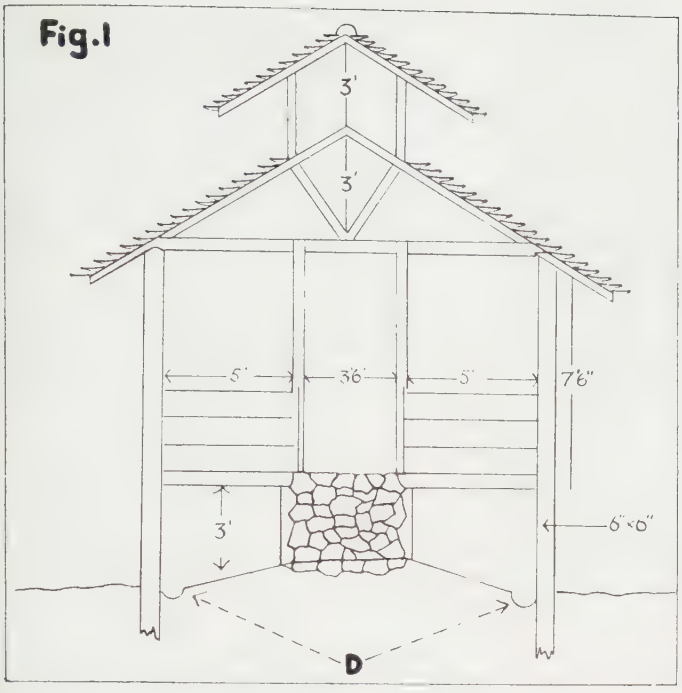
The Fermenting Boxes

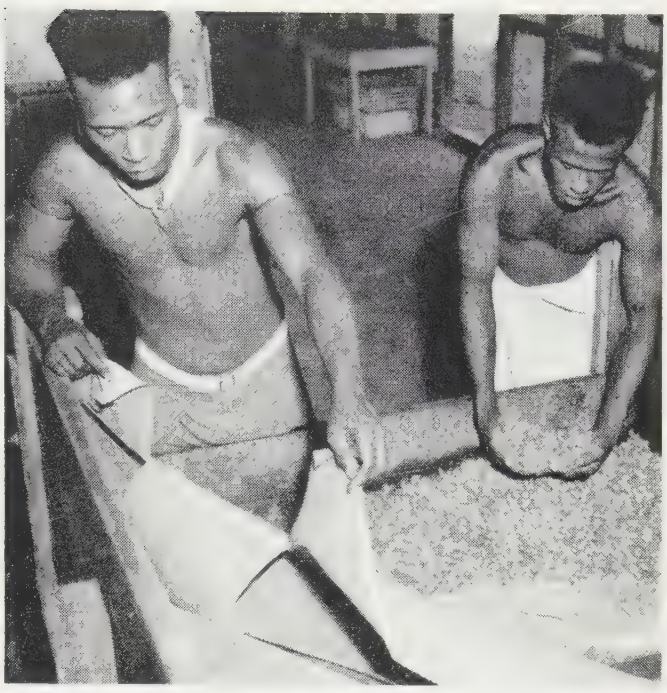
Practice has shown that the most suitable size for a fermenting box is 5′ x 4′ x 3′ high. The cubic contents of a box may be increased or decreased, but it is inadvisable to construct a box with a greater height than 3′. Higher boxes seem to have an adverse effect upon a ferment, besides making it difficult for an operator to shovel the beans from one box to another when the beans are being turned for aeration.

Boxes are best made of 12″ x

Sun drier with sliding roof at Keravat Agricultural Station, New Britain. During the drying process the cocoa beans are constantly turned with a solid wooden rake.

* "Some Pointers On The Harvesting of Cocoa," *South Pacific Bulletin*, April, 1961.





Above: Cross-section of a fermentary showing the usual system used for the drainage of cocoa fermentation sweatings. The central support, which forms the base of the passage between rows of fermenting boxes, is strongly constructed of stones cemented together. The drains ("D") are half-round glazed earthenware. Right: Cocoa beans in a fermenting box. Layers of banana leaves, which may be alternated with sacking, conserve the heat generated in the fermenting process.

1" dressed Oregon or other timber which will not warp. These boards should be made to fit into slots on three sides, so that they are removable. Height can then be altered if desired.

The floor boards are best spaced so that a match stick may be easily inserted between them. This is to permit the liquid sweatings to drain away from the fermenting mass, but prevent the beans from falling through.

Drainage on the ground below the boxes should be provided, otherwise the area will become foul and serve as a possible breeding ground for putrefactive bacteria. (See diagram).

Hillside Fermentary

If the planter has a hillside available for the erection of a fermentary, a series of terraces may be constructed upon which the boxes may be built as a labour-saving device. The fronts of the boxes are hinged, and when opened spill their contents into the one immediately below on a lower terrace. The beans are thus turned with a minimum of shovelling.

In such a fermentary, weighing and loading space is provided at the head of the hill, and after three terraces—one for each turn of the beans—washing and drying equipment is situated as close as possible to the fourth or lowest line of boxes. This again minimises handling.

In the British Solomon Islands, a processing plant at the Department of Agriculture's cocoa station at Auki is built upon a hillside, and functions satisfactorily. This plant is illustrated overleaf.

Space Estimate For a Fermentary

Sufficient space should be provided to take an estimated maximum crop at the harvest peak. On a new plantation with three-year old trees, the soil would have to be exceptionally good to ensure a tree yield of more than 4 lbs. This, reckoning 170 trees to the acre, would be approximately 6 cwts., green weight, to the acre annually.

The peak of a harvest rarely lasts more than 60 days, but during this period two-thirds of the total annual crop could be harvested. In some seasons, of course, the harvest can be spread over many months of the year, but in this case we are providing for a maximum peak.

Let us assume, then, that a planter has 34,000 x 3-year-old trees, all well grown. This, at 170 trees to the acre, would represent an area of 200 acres, fully planted. At an estimated annual harvest of 4 lbs. green weight per tree, such an area might be expected to yield 136,000 lbs. of cocoa beans. Two-thirds of this crop would be 90,666 lbs., spread over 60 days, or, say, 1,511 lbs. daily.

A fermenting box measuring 5′ x 4′ x 3′ contains 60 cubic feet of space. Each cubic foot of green cocoa beans weighs 50 lbs., so a box of the foregoing measurements can hold 3,000 lbs. A daily harvest of around 1,500 lbs. would therefore fill one half a box or one boxful every two days, and three boxes weekly. Fermenting for six days, the first boxful would be emptied in time to be refilled with the succeeding week's harvest. Therefore, picking would have to be done every two days to fill one whole box, and four boxes would be the planter's total requirements, the extra box being necessary for turning the beans.

Fermenting The Cocoa Beans

There are several reasons why cocoa beans must be fermented. The principal one is that the precursors of flavour operate in the fermenting boxes. Only properly-fermented beans lose the objectionable bitterness of under-fermented cocoa, and hold a true chocolate flavour.

Other reasons for fermenting are to halt the germination process in the beans by the destruction of the embryo, to loosen the seed-coat or testa surrounding the cotyledons, and to break down or reduce the fruit pulp to facilitate drying.

After the beans have been weighed, they are shovelled into the boxes and covered with alternate layers of banana leaves and sacking. This layering insulates the cocoa and so holds in the heat which is generated in the fermenting process. Because it is important during the last three days of a ferment

Inside a cocoa fermentary at Tafaigata, Western Samoa. The wide passage shown allows for a light gauge railway line to run between the rows of fermenting boxes. The building is well stayed and strongly constructed to withstand the enormous weights of wet and fermenting cocoa beans.

to keep the temperature within the fermenting mass to 50 degrees C., during colder, rainy weather it is sometimes the practice to line the boxes with banana leaves for extra insulation.

Correct Temperatures Are Important

From the commencement of the first day in the boxes, micro-organisms multiply rapidly in the natural sugar content of the fruit pulp, and through their activities fermentation begins. Chemical changes take place which produce heat. Temperatures rise to around 30° C. during the first twenty-four hours, and then increase gradually, until on the second day a maximum for the alcoholic ferment is achieved at 38° C.

In the early stages the organisms controlling the ferments do not require oxygen, and there is no point whatever in turning the beans until, after about sixty hours, the second stage of fermentation begins. Indeed, turning the beans will drop the temperature, which is not a good thing in the early part of the process.

About sixty hours after commencement of fermentation the beans die, and the second stage, or acetic acid ferment, begins. The micro-organisms which then take over require oxygen for their existence and a waste-product gas, carbon dioxide, begins to form in the sweatings around the beans.

Two reasons become obvious why the beans should then be turned. Firstly, the carbon dioxide must be got rid of if the product is to have a good chocolate flavour, and secondly, the cocoa beans must be aerated so that a supply of oxygen is readily available to the new micro-organisms. The best practice for the planter to follow is to turn the beans first on the morning of the third day and thereafter every twenty-four hours until the batch is finished.

When the second stage of fermentation begins the temperature of the fermenting mass should rise comparatively rapidly to from 45° to 51° C. It is important that this temperature be maintained until the cocoa is fully fermented.

In "Cocoa Fermentation," an article published in *Nature*, whose authors were R. V. Wadsworth and G. R. Howat (August, 1954), the writers gave findings of experiments in the fermentation of very small quantities of cocoa beans. Hitherto, experiments had only been conducted with comparatively large quantities of beans. No method had been evolved for fermenting laboratory-sized parcels. Scientific precision when handling large quantities of beans was often fogged by difficulties of exact heat control and interference by unwanted bacteria.

Using K. W. De Witt's laboratory apparatus (first described in 1952), Wadsworth and Howat were able to discover some factors which control chocolate flavour during fermentation. They found that "during the first 3½ days the temperature should not exceed 38° C. . . . when beans are maintained at a temperature of 50° C. for several days without a prior period at a germinating temperature, no chocolate flavour is developed."

Again: "Beans must be maintained at a temperature of about 50° C. for several days *after* the initial germination

The cocoa-bean processing plant at Auki, British Solomon Islands. The hillside fermentary, constructed in five steps, reduces labour costs by using gravity to transfer the cocoa beans daily from higher to lower fermenting boxes, turning and aerating them in one movement.

period. If this is omitted . . . they give either a mild flavour which is reminiscent of caramels, or have a slight liquorice character."

"The third factor," they wrote, "is the removal of carbon dioxide from the air around the fermenting beans. In certain experiments an atmosphere of carbon dioxide was maintained around the beans . . . chocolate prepared from such beans was unpleasant and had no chocolate flavour."

It will be seen that the plantation practices for fermentation which I have outlined are scientifically endorsed with respect to the production of a true chocolate flavour.

Period Of Fermentation

The fermentation period should be from 5½ to 6 days. If the process is continued to eight or nine days, decomposition will set in and a characteristic "fishy" odour will spoil the batch.

COLD FERMENTS: A cold ferment is the "Jabberwock" of the fermentary. Its icy claws grip, and temperatures will not rise. The whole batch runs yellow with a slimy putrescence. It can be promoted by:

(i) The inclusion of too great a proportion of beans infected with black pod disease;

(ii) washed beans (i.e. green cocoa left out too long in rain squalls);

(iii) an invasion of putrefactive bacteria during a long spell of wet, cool weather with continuously overcast skies.

There is little a planter can do in the fermentary to correct a cold ferment. With additional cover and wall insulation to gain as much heat as possible, the beans should be left in the boxes for the usual period.

When beans are taken out of the fermenting boxes they should be carefully washed two or three times and then drained before they are placed in a drier. Initial heat should be high until all surface moisture has gone. Drying may then be continued at the normal 120° C. for a total of twelve hours. After this period in the drier the beans should be removed and spread to cool.

This hot-air type cocoa drier on Waigani plantation in the Milne Bay District of Eastern Papua can produce 1½ tons of cocoa a week.

The following day the cocoa should be damped down with water until all the beans are evenly wet, then returned to a drier for finishing. In this case, finishing in a McKinnon rotary drier will work wonders with such under-fermented beans.

After a cold ferment it is common practice to scald out with boiling water all boxes which contained the batch. This will help to destroy any remaining unwanted bacteria. If disinfectant is used, the boxes should be thoroughly rinsed out before a new lot of cocoa is fermented.

Testing For A Completed Normal Fermentation

After five-and-a-half days the planter should begin to test his cocoa to find whether fermentation is complete. A number of cocoa beans should be taken at random from the mass and split open with a sharp knife, lengthwise. If fermentation is complete all the samples should display the following characteristics:

(i) The cotyledons should be open and their components will move freely when pressed;

(ii) When pressed lightly the cotyle-

Below: Samoa-type cocoa drier at Naduruloulou Agricultural Station, Fiji. Right: The drying tray.

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dons will exude a small quantity of brown-coloured liquid;

(iii) The cotyledons should be a watery, pale mauve-brown;

(iv) The outer skin or testa will be free of the cotyledons;

(v) Stiff, marble-like, purple or white beans are under-fermented.

The colour of a well-fermented bean naturally varies a little according to whether a bean was originally white, mauve or purple. These colour variations are normal in most Pacific island plantations where the *Criollo-Forastero* hybrid is commonly planted.

Washing Process

The process of washing lies entirely at the option of the planter. It is traditional in some localities. For instance, in Western Samoa most plantation cocoa is machine-washed, while some smallholders hand-wash their cocoa in nearby streams.

The appearance of washed cocoa beans when dried is considered superior because the cocoa is cleaner-looking, and there is a small but appreciable difference in the weight of the parchment or testa. Washed beans are lighter, both as to colour and weight.

Some planters consider that washing eliminates acetic acid from the product, but if this is so, the reduction in acid must be confined to the outer skins which, except for the extraction of theobromin, are not generally used by manufacturers.

Unwashed beans are less breakable than the washed product, because the adhering dried remains of the fruit pulp has the effect of toughening the skins. Fewer bare beans and fewer nibs may be expected to be found in parcels of unwashed cocoa beans.

Mechanical washing drums are used on large estates, but these are fairly expensive, and are confined to those plantations with piped water supplies or very large tank installations.

Small frame washing boxes, 3′ x 2′ x 2′ deep, with sides and bottoms of cocoa mesh tray wire, are useful to have whether the planter includes washing in his routine or not. These can be used in an emergency where cocoa must be washed following a cold ferment. Such boxes may be fitted with handles which protrude from both ends for easy carrying to the nearest stream or tank.

The Drying Process

It is not possible to describe in this short article the various types of driers which are used for cocoa drying throughout the region. The planter is referred to textbooks and to SPC publications on the subject.

Machine driers are either forced-

draught platform hot-air driers or rotating drum types, such as the McKinnon. In the latter, the hot air is blown through a hollow bearing into the centre of a revolving drum, and passes through the constantly-turning cocoa within the drum.

A platform drier is simply an improved sun drier which dries cocoa on a slatted platform whether the sun is shining or not, by the use of hot air. These are fitted with an enclosed chamber, below the platform, through which passes a flue leading from a furnace to a smoke-stack. The air around the flue becomes heated and rises through the slats of the platform upon which the cocoa beans are spread. They are fitted with a roof to protect the cocoa beans from the rain.

Some platform driers, notably the "Martin" type, have sliding roofs which may be run off on rails when the sun is shining. Such driers then combine sun drying and hot-air drying simultaneously.

A well-dried batch of cocoa will contain not more than 6 per cent of moisture, and during the course of drying the beans will shrink in weight by from 62 to 65 per cent as a result of loss of moisture by dehydration.

In a revolving-drum type of mechanical drier the beans are constantly turned, but on a platform drier the cocoa must be turned regularly by attendants using wooden shovels. Turning is necessary to ensure that all the cocoa beans are evenly dried. This should be done every hour until the beans are surface-dried, and thereafter every two hours until drying is concluded.

It has been found by practice with many types of hot-air driers that the best results are obtained with fairly high temperatures until the product has lost all surface moisture. At this point firing is diminished, and the drying is concluded slowly with temperatures no higher than 120°. This system holds the advantages of preventing the formation of surface moulds, shortening drying time and toughening the skins so that they may better withstand breaking during shovelling and drying.

Drying times vary considerably according to the construction and type of drier, its placement with regard to prevailing wind (a furnace should always face the prevailing wind for draught assistance), care taken in maintaining correct temperatures and turning of the product and, in the case of a drier with a sliding roof, the amount of sunshine available. Only practice with any drier will establish its special idiosyncrasies and reveal for the planter its maximum speed, consistent with quality production.

In all hot-air driers the planter should provide an adequate number of cold-air inlets or vents, and ensure that they lead below the bottom level of the flue pipes.

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It is safer to have too many than too few. Rising hot air will only draw in sufficient cold air to replace its own volume.

Before removing a batch of cocoa beans from a drier they should be tested for dryness. A well dried bean should possess these qualities:

(i) It should crackle when squeezed between finger and thumb;

(ii) when sliced open the cotyledons should present an open texture and their component parts should be brittle hard;

(iii) cotyledon colour should be from cinnamon brown to brown;

(iv) there should be no soft moist beans.

Finally, the cocoa should be laid out on a floor to cool after it is taken from the drier. Hot cocoa, even if it is bagged for only temporary storage, is likely to sweat and become covered in mould. Mouldy cocoa should be carefully hand-washed and then returned to the drier.

Fiji Women Find New Interests

(Continued from page 55)

It became clear that an evaluation by the planning committee of the week's activities was called for. The result of that meeting was a unanimous decision that further work of this nature should be undertaken. It was also approved that a suggestion to organise a "Home and Family Week" early in 1962 should be forwarded to the Fiji Council of Social Services.

It was recognised that the women wanted to involve the men in the activities, and that a purely women's exhibition was not going to get across what they were aiming at. It had been noted that among the most interested spectators had been the men, and senior schoolboys. One man who had very intently watched the demonstration on bathing a baby, and to whom one of the attendants spoke of his interest, replied—"Yes, I'm about to have one, and I should know what to do."

In the words of one of the committee members: "There has appeared a growing awareness among women that their own lives can become more interesting —and those of their little ones immeasurably improved—through the furthering of their knowledge. Actually, since the foundations for the future are laid in early home life, the effects extend beyond the home, and can influence and inspire children towards greater attainment."

Those who are aware of these things have a responsibility to bring them before the public, and there is no better way than through the various racial groups working together on a project such as the proposed "Home And Family Week."

Health Education In Saipan Schools

At the 1960 Summer School for teachers held on Saipan, a health education course was conducted by the Commission's health education officer. Below appears a brief account of a "follow-up" of this course, carried out by . . .

MYRTLE A. HOLMSTAD*

At the Oleai School—a health activities display of posters, flannelgraphs and other visual aids being inspected by the Principal, Mr. Felix Raubaujman, and Miss Myrtle Holmstad.

MOST of the teachers for the Saipan District primary schools are trained locally. Some of our students are fortunate enough to visit Guam, or even Honolulu or the United States, for their training, but the majority still come to us directly from their own secondary schooling.

For some years now we have also run a "Summer School" for our teachers during the long vacation. Here, trainee teachers are given concentrated instruction by means of practical work, under the guidance of supervisors, in making plans and time schedules, in teaching methods and techniques, and in the handling of classes. They may also attend special courses in such subjects as English, home economics, Chamorro (the local language), art, typing, etc.

There are other courses for fully-trained teachers, and sometimes we have the help of outside personnel in running these. An example was the special course in Health Education for Teachers run in June of last year with the help of the South Pacific Commission's health education officer, Miss Leonie Martin.

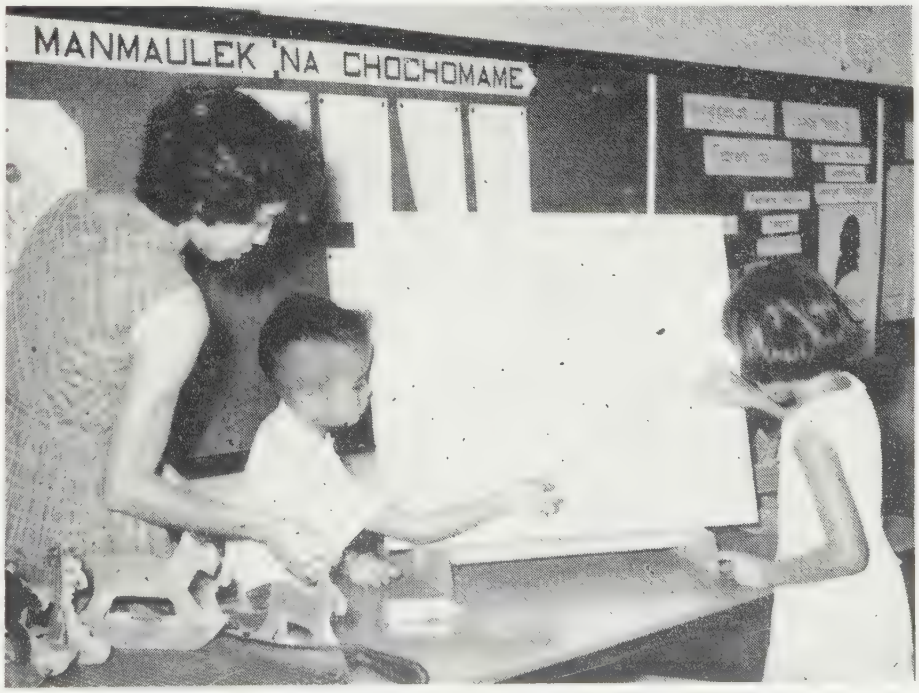
"Follow-Up" Of Health Education Course

Recently I visited all schools as a "follow-up" of the health education course, and it was most interesting to see the different manifestations of the health work in the various schools. Flannelgraphs were very popular everywhere, and so were posters. Many of the teachers are using as their basic health texts the health outlines they had worked out together.

In most of the upper grades, the teachers and children have made "health rules" to follow. They have also been interested in drawing the different systems of the body and outlining their functions. The middle graders have gone in more for posters and pictures with captions.

The lower graders are busy with their flannelgraphs and puppets, also the flip cards. Then, too, if they want to discuss bathing they are not above bringing in a basin, soap, towel and water and giving demonstrations with their dolls. It's lots

* Miss Holmstad, Supervisor and Teacher Trainer, has been in charge of primary school teacher training on Saipan for the past ten years. After giving initial training to prospective teachers, she continues throughout the year to give personal help and guidance to the staffs of all primary schools.



First-grade teacher Mrs. Marianna Aldon with two of her pupils, building a flannelgraph on sanitation.

of fun. In these grades, too, we have found reading charts on cleanliness.

The flannelgraphs have been used in many different ways to show island fruits and fish, as well as to tell the story of sanitation (unfortunately the accompanying black and white pictures do not do them justice).

Saipan has a public health nurse and a public health corpsman who make rounds of all the houses on the island. They point out the danger of unclean homes and premises, and they also tell the mothers how to take care of their new babies and how to observe sanitary conditions, both in person and in the homes. This ties in well with the new health lessons in the schools.

I feel that the summer session conducted last year by the South Pacific Commission's health education officer has made all of our teachers more conscious of the need and importance of health education, and it has carried over into both their classrooms and their homes.

The Deputy High Commissioner, Mr. Jose A. Benitez, opens the Seminar. On his left is Mr. Francis B. Mahoney, Palau District Administrator, and on his right, Mr. R. H. Boyan, SPC Co-operatives Officer.

CO-OPERATIVES SEMINAR AT KOROR

SIX districts of the Trust Territory of the Pacific Islands were represented at a Seminar on co-operatives and credit unions held at Koror, Western Caroline Islands, from July 21 - August 3 last.

The Seminar was organized by the District Administrator of the Palau District, Mr. Francis B. Mahoney, and was led by the South Pacific Commission's Co-operatives Officer, Mr. R. H. Boyan.

The Deputy High Commissioner, Mr. Jose A. Benitez, flew to Koror on July 20 to officially open the Seminar on behalf of the High Commissioner, Mr. Wilfred Goding. In his speech, Mr. Benitez stressed that co-operatives are an educational movement which makes use of economic action to make a community, an island, a better place to live in.

American and Micronesian participants mostly came from Government Departments, but also represented were the Yap Trading Company and newly-formed credit unions in the Palau District.

The Seminar was organized primarily as a training course, but the problems associated with sound and useful co-operative development were exhaustively discussed, and in a final evaluation session, conclusions and recommendations were recorded.

WHO Rural Health Course In Western Samoa

The World Health Organization will conduct a six weeks' course on "integrated rural health" in Apia, Western Samoa, during November and December. About twenty assistant medical officers representing most of the Pacific territories are expected to attend.

The course, which will be directed by the Commission's Acting Executive Officer for Health, Dr. W. Norman-Taylor, is primarily intended for assistant medical officers who are responsible for public health activities in rural areas. Emphasis will be placed on promotive and preventive health work.

Among the lecturers will be Dr. A. Elizabeth Wilmot from the Maternal and Child Welfare Branch of the Victorian Health Department, Melbourne, and Mr. B. L. Adan, WHO Public Health Engineer, from Manila.

Health Education Course In American Samoa

In American Samoa, sixteen senior officers—all Samoans—from the Departments of Health, Agriculture, and Education, attended a course in health education held at Pago Pago from August 7 to 16. It was conducted by the Commission's health education officer, Miss Leonie Martin, and its main purpose was to devise the most effective ways of ensuring inter-departmental co-operation in planning and carrying out health education campaigns.

At the end of the course a joint committee was formed from members who had attended, the Chief Public Health Nurse, Mrs. Arieta Mulitauaopele, being elected chairman.

Miss Martin returned to SPC headquarters on September 3, and the following week left for the British Solomon Islands to plan health education courses for local leaders who will take part in a malaria eradication campaign to be undertaken there shortly by the World Health Organization.

Urbanization Advisory Committee Meeting

In many South Pacific territories, populations are becoming concentrated in port towns and urban centres, creating a variety of social, economic and health problems. To assist Administrations to minimise the detrimental effects of this trend, the South Pacific Commission has set up an urbanization committee to study and advise on the problems involved.

The committee's first meeting was held in Honolulu early in September, immediately following the Tenth Pacific Science Congress. A number of distinguished scholars present at the latter attended the urbanization meeting as consultants.

The committee reviewed present urbanization trends in the South Pacific and measures taken to cope with them. It also drew attention to the main problems needing further study. At the Commission's request, the committee has drawn up an overall project plan within which specific research studies may be undertaken.

New Radio Station For Tonga

Tonga's new broadcasting station ZCO Nuku'alofa—"The Call of the Friendly Islands"—was formally opened by Her Majesty Queen Salote Tupou on July 4.

The station, which is controlled by the Tongan Broadcasting Commission, operates on a frequency of 1020 kc. with an aerial power of 10 kw. The present schedule comprises a breakfast session from 7-9 a.m. Tongan Time (1800-2000 GMT), and an evening programme from 7-10 p.m. Tongan Time (0600-0900 GMT).

Fish Poisoning In The Tropical Pacific

(Continued from page 21)

United States and the South Pacific Commission.

We have prepared a booklet with a technical discussion of fish poisoning; this, with questionnaires on which to record actual cases of fish poisoning, will be sent by the South Pacific Commission to all medical personnel in the whole of the central tropical Pacific. The Commission will also translate the booklet into French for personnel on the French islands.

If any of the residents of the islands wish to help us in our work, we would appreciate the following information in letters:

(i) Comprehensive accounts of toxic fish in any specific area.

(ii) Accounts of any cases of poisoning resulting from the eating of any marine animal, either recently or in the past, with as detailed information as possible on the fish causing the poisoning and the results of the poisoning.

(iii) Any information on locally-used cures, if possible with dried specimens of the plants used.

This information can be sent to the Director, Hawaii Marine Laboratory, University of Hawaii, Honolulu 14, Hawaii.

Two Common Questions

Finally, there are two questions always put by the residents of the islands: Which fish are always safe? What is an easy way to discover if any particular fish is safe to eat?

For the first; any fish that is caught in the open ocean, like the tuna, the flying fish, and the dolphin have never been known to cause poisoning when fresh. The second question is more difficult for, actually, there is no easy way to be assured that a fish is nontoxic. If the fish is doubtful, it would be best to feed the potentially highly-toxic liver and other viscera to a cat; if it does not show any ill effects in twelve to twenty-four hours, the fish is safe.

The Breadfruit Tree In Micronesia

(Continued from page 39)

ing breadfruit exist, but they differ only in some details.

As most of the breadfruit on Kapingamarangi Atoll ripens in February, there is a surplus of fruit at that time. A common method of preserving breadfruit on this atoll is the preparation of breadfruit "sheets", which are called TIPAK. For this purpose, skin, core and seeds are removed from nearly mature breadfruits. Seeds are immediately eaten after cooking or roasting. The fruit is then cut into small pieces

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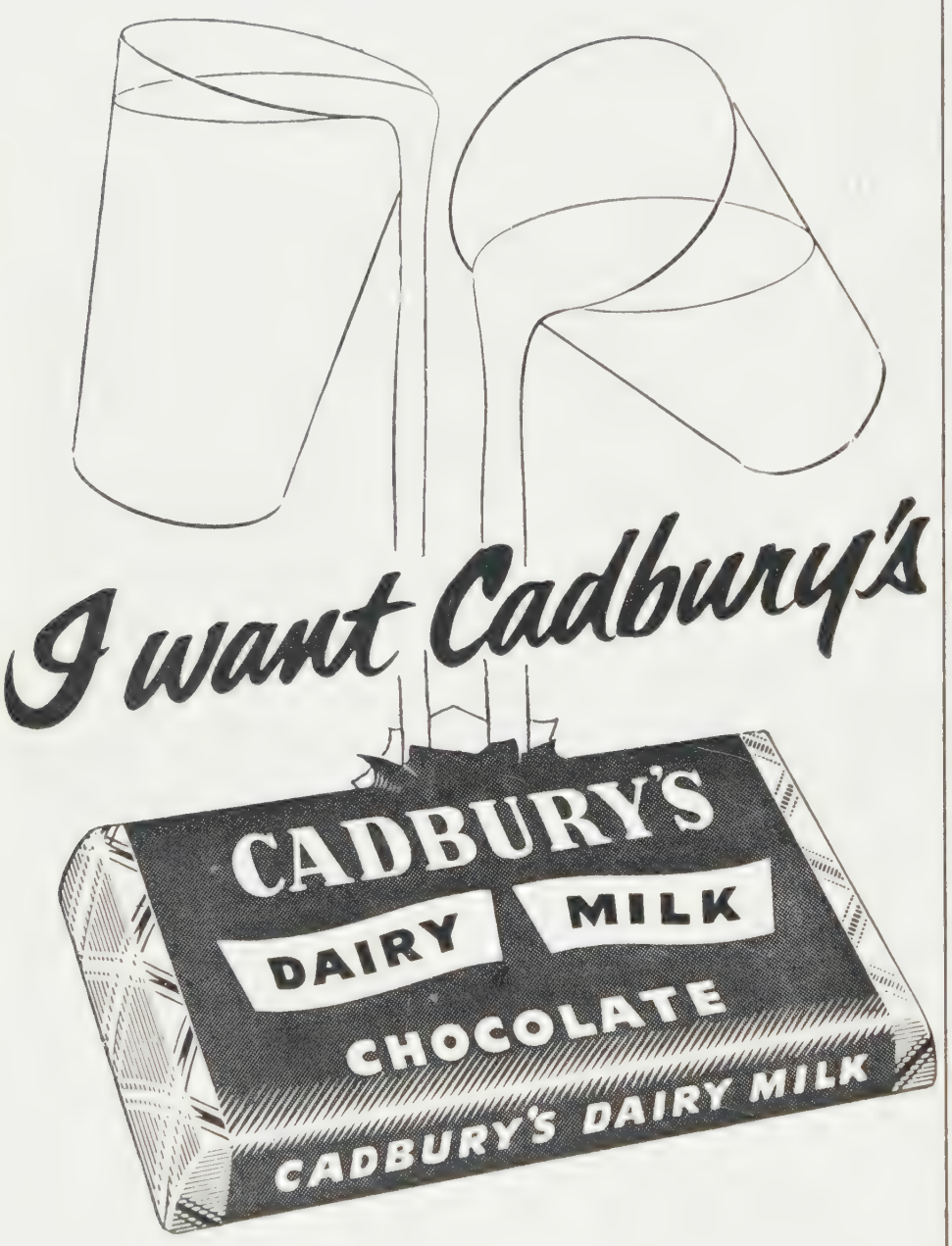

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and packed in coconut leaf baskets, which are placed in a native oven on hot coral stones, the whole being covered with a mat and then sand. After one day the breadfruit paste is taken out and mashed with a stamper in a wooden bowl. The paste, which is a brown colour and has a sweet smell, is spread out on coconut leaf mats to dry in the sun. The sheets, which are about 5′ long by 1′8″ in width, are rolled up when dry and wrapped in pandanus leaves. The cylinder so formed is tied with string made from coconut fibre and then stored. The islanders claim that, in this state, breadfruit is preserved in good condition for at least three years.

Marshallese Breadfruit Variety Tolerates Salinity

Root cuttings of three interesting Marshallese breadfruit varieties were collected and sent to Western Samoa and Tahiti. One of these was the seeded variety called MEJWAAN, which is grown and found on almost all of the atolls in the Marshall Islands. It is reputed to be quite resistant to brackish water and salt-spray influence and, for this reason, could very well be of interest for many small atoll islands.

Root cuttings of MEJWAAN were sent to French Polynesia and were received in good condition at the Department of Agriculture in Papeete, Tahiti. After the nursery period and further propagation, distribution to the atolls of French Polynesia will follow.

The fruiting season in the Marshalls differs very little from that of the Caroline Islands. It usually starts in May and extends through to August, the months of June and July being the period when most breadfruits are available. There is a short off-season in December and January. The methods of preparing and preserving breadfruit are very similar to those used in Kapingamarangi Atoll.

Another method of breadfruit preservation was seen in the Marshall Islands and also on Ponape. As is frequently the case in Polynesia, the basis is a fermentation process. After the fruit is peeled and the core removed, it is cut in half and the flesh immersed for one night in the lagoon and then left for one night in the open air to soften. The whole is then put in a pit and covered with dried breadfruit leaves and stones. Every fortnight the leaves are renewed. In this manner the breadfruit paste can be kept for almost six months. When used it is removed from the pit, the paste mashed and coconut milk or other ingredients added. It is then ready for cooking.

Breadfruit Consumption Decreasing In The Palaus

Before leaving the United States Trust Territory of the Pacific Islands, a short

visit was paid by J. Coenen to the Palau Islands, where specimens of five seedless and one seeded variety were collected. A common variety called CHEBECHAB is easily distinguished by the leaves, which are very deeply cut into many lobes. The fruit of this variety, which is oblong, is best prepared by roasting on hot stones.

Because of the importation of other starches such as flour and rice, the consumption of breadfruit is decreasing in the Palau Islands. Another very important reason for this decrease is the introduction of cassava (*Manihot esculenta*), which is easy to cultivate.

An interesting point about the Palau Islands is the occurrence on small uninhabited islets of wild *Artocarpus mariannensis*. This species is undoubtedly of great interest as far as the origin of the cultivated breadfruit tree is concerned.

New Ways Of Learning For Village People

(Continued from page 43)

can be safely presumed that what they have learned will be spread by the very human factor of gossip, when they talk of the new ways to their village friends.

Following this principle, short training courses have been held this year at Vunadadir (2), Dregerhafen, Kerema, Sogeri and Bogia (Madang). The syllabus comprised the following subjects:

Infant welfare—care of mothers—cooking—sewing—improvement of diet—first aid—personal and village hygiene—simple carpentry—road safety—village councils (including discussions on the need for better roads, subsistence and cash crops and the need for schools)—co-operatives.

Discussion groups and films were used to illustrate the courses, which lasted three weeks. The support of the various Administration Departments such as health, education, agriculture, police, public works and extension was freely given, and the instructional approach was kept at a truly "down-to-earth" level.

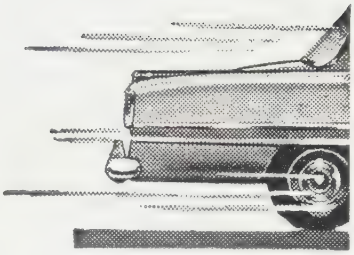
To date, 194 married couples have completed the course, which means that 388 persons will take back the ideas of general development to their areas.

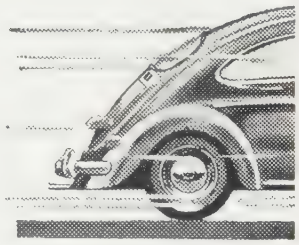
Courses attended by women only have been conducted along similar lines—500 have received training in this way.

The native people have welcomed the scheme with enthusiasm, and His Honour the Administrator has been approached by the Rabaul Native Local Government Councils to continue it.

Ever-Increasing Flow Of Knowledge

It is hoped to expand these methods, the objective being a regular and





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ever-increasing flow of knowledge which will reach even the most isolated communities. A vital channel of communication between the Administration and the village people —leading to their support by understanding the efforts being made towards their social, political and economic betterment —will thus be established. Perhaps of even more importance is the fact that the adult population will not be separated from the children who are attending schools.

As Mr. Kondom said: "The parents will be able to walk the same road as their children."

Malaria Experts Meet In Hollandia

(Continued from page 48)

DR. A. C. VAN DER GUGTEN, Medical Officer, Netherlands New Guinea.

MR. M. VAN OS, Assistant Malariologist, Netherlands New Guinea.

The World Health Organization, whose constant guidance and assistance to anti-malaria campaigns in the region have contributed largely to the success so far obtained, was represented by a special delegate:

DR. M. POSTIGLIONE, Senior Regional Malaria Adviser, Western Pacific Regional Office, WHO, Manila, Philippines.

Two Years Of Progress

The meeting devoted considerable time to the exchange of knowledge gained on malaria problems, and the progress made in the fight against the disease during the two years that have elapsed since the first Conference. Again, it was demonstrated that a thorough knowledge of malaria is necessary for its successful control, and that the campaigns in the region have benefited greatly from the basic investigations regarded as essential in each country's health programme.

Malaria parasites are transmitted by *Anopheles* mosquitoes. These will take several blood meals within their lives, and will become infective after a certain length of time after the ingestion of human blood containing sexual forms of the malaria parasite. Anti-malaria measures are based upon the principle of the fight against these mosquitoes, by means of house spraying with insecticides. In areas that are sprayed, mosquitoes will run the risk of being poisoned every time they enter a human habitation for a feed. Transmission of malaria will thus be interrupted if, due to this risk, mosquitoes do not survive the time-span between the uptake of sexual parasites and the moment of becoming dangerous.

The Conference again agreed that for the south-west Pacific region, house spraying with insecticides is the best anti-malaria measure. But, as investigations made in the last few years have shown, mere spraying of inner walls of houses is often not sufficient. It may sometimes be of value to spray underneath houses as well, because *Anopheles* will rest there after taking blood meals out of doors. Furthermore, in some areas a part of the transmission takes place in shelters and lean-to's in the bush, in sago-swamps and in gardens. If provided with walls, these structures can easily be treated with insecticides. Nevertheless, sometimes the people's habits are such that extra-domiciliary transmission is responsible for a certain number of malaria infections. Under such conditions insecticides reduce the transmission without stopping it, and additional methods of malaria control are necessary.

Here drugs will solve the problem. However, they also introduce the problem of how they are to be distributed, for in mass drug treatments, it is essential that nobody be excluded. Tablet campaigns are often very successful, but not always can full attendance be secured. The distribution of salt, mixed with drugs, is being investigated as an anti-malaria measure in areas where house spraying combined with tablet distribution are not feasible. So far the results look promising.

Total Coverage

On reviewing progress to date, the Conference recognized the extreme importance of total coverage as the fundamental principle in all anti-malaria operations. What total coverage implies, with regard to insecticide sprayings or drug distribution, will in practice depend on the local epidemiological conditions (as follows from the above) and may be different from area to area. However, the south-west Pacific region being a natural unit, it reveals epidemiology patterns that are, within certain limits, comparable.

It was therefore decided that in their anti-malaria campaigns, member countries should investigate the methods of securing total coverage in all operations, and that information about the results should be exchanged as fully as possible.

The Conference stressed also the importance of inter-country visits by personnel employed at all levels.

Future Prospects Promising

It was sincerely felt that, from the technical point of view, it is possible to interrupt the transmission of malaria, and that step by step malaria eradication in the region will come closer. When this stage will be reached is as yet difficult to foresee, but in many treated areas the campaigns have already resulted in interruption of transmission at a local level.

Methods to deal with secondary transmission are being developed and will be available even sooner for wide-scale programmes, since co-ordination within the region is now more firmly established.

PACIFIC READING

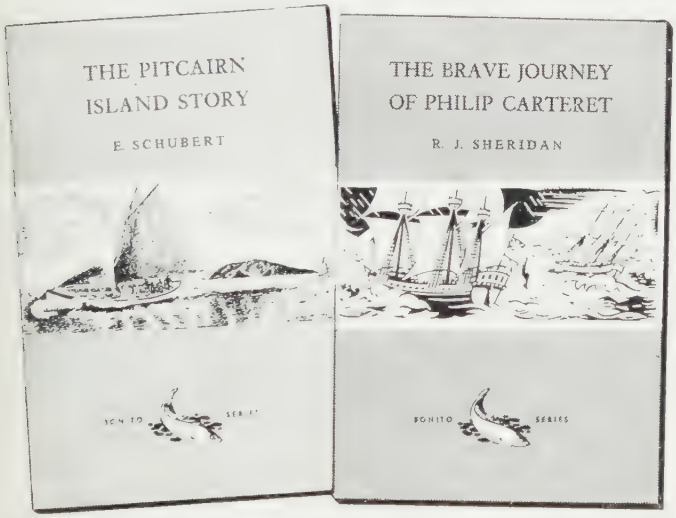
Material in this section is contributed by the South Pacific Commission Literature Bureau. Any enquiries relating thereto should be directed to Box 5254, G.P.O., Sydney, Australia.

Literature Bureau Publications

The following publications have been produced in recent weeks by the Bureau in co-operation with publishers and on behalf of various island administrations.

The Pitcairn Island Story and The Brave Journey of Philip Carteret, the two new titles in the Bonito series of supplementary readers referred to in these columns in the April, 1961, issue, have now been published by Longmans, Green & Co. Books in this series are confined to topics of a factual and historical nature with a Pacific background, and it is felt the latest titles should be a welcome addition to the growing list of suitable reading matter for Pacific Islanders.

In *The Pitcairn Island Story* (price A.2/6), the author, Mr. E. Schubert, a former Education Officer on the Island, says—"Pitcairn Island is only two miles long and one mile wide. It is away by itself in the South Pacific Ocean. It is an old dead volcano. You might wonder why anybody would ever want to live away out there in the vast ocean.



But people do live there today and have done so since 1790. Why did they first go there and what are they like today?" With this theme the author weaves a fascinating story, describing in detail the eventful history of this lonely Pacific island from the arrival of the "Bounty" mutineers in 1790 to their present-day descendants, and concludes with an interesting insight into the daily life of the modern islanders. The text has been written in a simple, direct style, and is well illustrated with eleven photographs and a two-page map showing the wanderings of the "Bounty" before she finally reached Pitcairn.

The second title, *The Brave Journey of Philip Carteret* (price A.2/-), by R. J. Sheridan, is also a seafaring tale which should have wide appeal to most island readers. It relates the sea voyage of the explorer Philip Carteret through the South Pacific area about 200 years ago. In those days, making a long journey in a ship was hard and dangerous, and often the captains and crews suffered

OXFORD BOOKS

ON ARITHMETIC

The following are some of the books published by Oxford University Press to help in the teaching of arithmetic to youngsters to whom English is a second language. They are all written by L. W. Downes, D. Paling and F. Smithies.

THE TEACHING OF ARITHMETIC IN TROPICAL PRIMARY SCHOOLS 15/-

This big book (500 pages) has a strictly practical aim: it is intended to show the many ways in which teachers may help children to learn arithmetic. It is hoped that it may also help teachers to get a better understanding of the subject, so that, in turn, children may understand better what they are taught.

TABLES 5/6

This helpful handbook embodies a suggested method of using interesting devices to present number facts and building up tables incorporating them.

THE OXFORD ARITHMETIC COURSE—NIGERIA

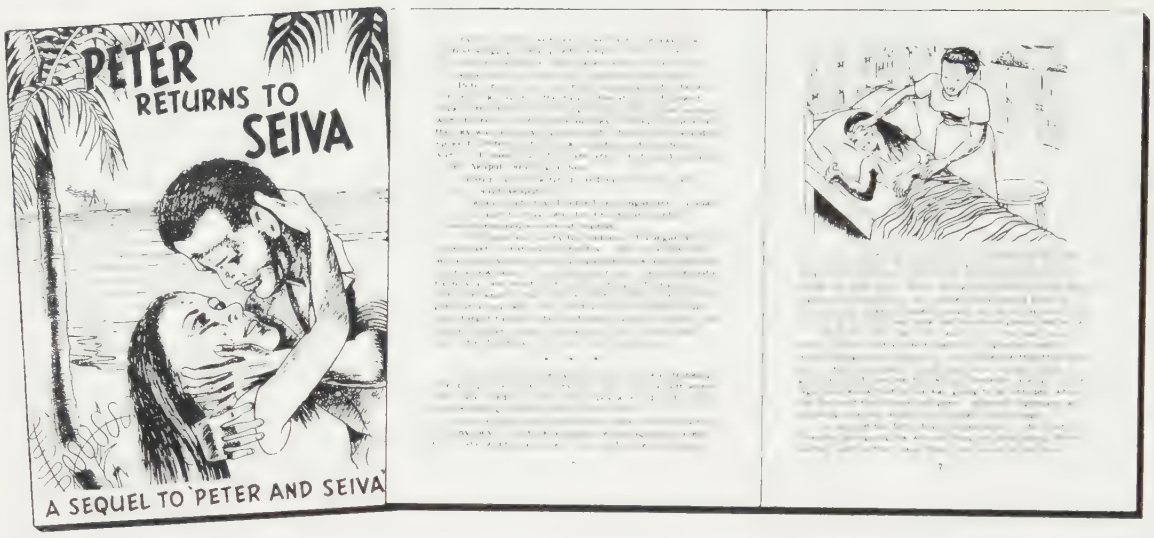
Book One 2/4
Book One Teacher's Notes 5/–

This gay course, printed throughout in two colours, begins with nine pages of pictures, each ten inches by seven. From counting and drawing the objects in these pictures (and suggested allied informal experiences of number), the Course takes children through the basic operations, using pictures and diagrams practically all the time. The *Teacher's Notes* is a 150-page book full of help for the teacher; it sets out the preparation necessary for each lesson, the aim of the lesson, and the methods of achieving it. Inspection copies are available at the address given below.

All prices are quoted in sterling currency.

OXFORD UNIVERSITY PRESS

7 BOWEN CRESCENT MELBOURNE



Front cover and specimen pages of "Peter Returns To Seiva", now available from the Literature Bureau.

terrible hardships. This is the story of one of the hardest journeys ever undertaken.

Both books should be suitable for use as a supplementary reader at about 4th to 6th year level of English, and are equally suited for either school or adult reading.

Peanut Recipe Book. Peanuts are a rich source of protein and in many Pacific areas are now being used to supplement, or even substitute for, fish and the more expensive meat, in the Islander's diet. A small recipe book entitled *12 Things to Do with Peanuts* has just been produced by the Bureau. It describes in detail how peanuts may be used in soups, stews, roasts, cakes and even sweets to provide more attractive and appetising meals. Attractively produced in two colours, this book is similar in format to the companion volume *12 Things to Do with Rice*. Recipes appear on the right-hand page only, the left-hand pages being left blank for the inclusion by the user of other recipes or local variations of the dishes described. For those unfamiliar with measuring terms, a measuring guide showing the relative size of a cup, a teaspoon, a tablespoon and a condensed milk tin is printed on the inside covers.

Copies of this booklet may be obtained from the Literature Bureau, Box 5254 G.P.O., Sydney, N.S.W., Australia, price A.1/- per copy plus postage.

Grow Good Robusta Coffee is the title of a 28-page book recently produced in English, Pidgin and Motu editions for the Department of Agriculture, Stock and Fisheries, Port Moresby. This is the fourth title in a series of small agricultural extension booklets intended for village and field use, the earlier titles being *Let's Grow Peanuts; Grow Good Coconuts;* and *Let's Make Good Copra*. Simply written and illustrated with clear line drawings, this latest book details in narrative form the correct procedures for the successful growing of Robusta coffee. Topics covered include clearing the land, marking out and planting shade trees, growing coffee seedlings in a nursery, transplanting the seedlings and finally the method of pruning trees.

A specimen copy of the English edition with details of production is available on request from the Literature Bureau, Box 5254 G.P.O., Sydney, N.S.W., Australia.

Peter Returns to Seiva. Stocks of this book—the sequel to *Peter and Seiva*—are now available from the Literature Bureau, price A.3/- per copy, with a discount on all orders for twelve or more copies. Readers will recall that *Peter and Seiva* ended with Peter sailing away and leaving Seiva behind. The present book carries on from this point, and relates the adventures which befell Peter and others on the schooner before he finally returned to Tongamanu and Seiva. The cover and two pages from this book are shown above.

Visual Aids: *Poster Productions*. Recent poster productions include a four-colour dental poster in English, Fijian and Hindustani languages for the Education Department, Fiji; a five-colour anti-T.B. health brochure with Tahitian text for French Polynesia; and a six-colour soil survey map for the British Solomons Islands Protectorate Government.

Sample copies of any of these materials with details of production costs are available on application. Further enquiries from territorial administrations concerning the

A Course in Junior Science

H. CREASER, B.Sc., A.R.I.C.

This book is for about the seventh and eighth years of school. It makes possible the teaching of science, apart from biology, in places where the provision of laboratory equipment is limited. The book contains sections on air, water, heat, simple measurements, machines, sources of power, and light.
London published price 3s 6d

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production of similar or other types of posters would be welcomed by this Bureau.

REPRINT—A FIRST HYGIENE BOOK. In response to demands, a further reprint of the well-known and widely-used publication, *A First Hygiene Book,* has just been arranged by the Bureau; copies of this edition should be available in about four to five weeks' time.

All orders should be sent to the Literature Bureau, Box 5254 G.P.O., Sydney, N.S.W., Australia, price being A.3/- per copy, with a discount on all orders for twelve or more copies.

Miscellaneous

USING VOCABULARY LISTS. In language teaching, increasing interest in the structural approach has recently tended to dilute concentration on the "controlled vocabulary" which figured so prominently in the preparation of supplementary reading materials over the last couple of decades. This is not the "be-all" and "end-all" of the matter. Nevertheless, the use of carefully-selected vocabulary lists is still of vital importance.

E. W. Dolch, of the College of Education, Ohio State University, makes some stimulating observations on the *use* of such lists. He says—

"One plan that seems to be followed by those preparing readable materials is just to take any reading material they find and wish to use, check the vocabulary with a list, and 'substitute easy words for hard ones,' thus securing the desired grade rating. This is a good plan as far as it goes. It does not adapt method of presentation. It does not adapt language pattern. It does not consider that merely substituting words for words may give inaccurate meanings or may damage the idiom of the language.

"A second plan seems to be to have someone 'rewrite' the materials in the easier vocabulary. Such a 'writer' tries to tell the story or explain the idea in easier words, with one eye always on the list to make sure he keeps within it. The result we see in many school readers and other books: It is often a very 'lame' or 'wooden' kind of writing, shorn of all spontaneity and creativeness. It is this kind of writing that has made so many teachers hate the word 'adapted.'

"A third plan, and one that is the most successful, starts with the writer studying the audience he is writing for. If it is the average adult, he sits in buses or restaurants or wherever people talk, and listens to their kind of language and their type of vocabulary. If the writer is writing for children of a certain grade, he sits in the grade room of various schools for several days and follows the children to the playground, listening to how they express themselves. Then the writer, when he has the 'feel' of his audience, sits down to write, keeping the audience right before him in his mind's eye. He writes directly to them. After he has written, he may actually read the material to the desired audience and watch their reaction or talk with them about it. Then, when he thinks he has 'hit it right' he takes out his word list and figures his percentage. If it is wrong, he may alter a word here or there, but he will not need to do much. He will have found the level of his vocabulary and language pattern beforehand. He will have *created* at that level, not just 'adapted' to a level.

"Perhaps all three of these methods of preparing material will have to be used. For adults, perhaps the more mechanical adapting may do for many purposes. For children, it is to be hoped that the creative method will be used. Reading matter for children needs the charm and appeal that can only be secured by creating at their level."

BASIC PHYSICAL EDUCATION FOR BOYS

J. KEEGAN

This book is an attempt to give guidance to teachers of physical education. The activities detailed are mainly of the type that require no apparatus. However, suggestions are made for the use of improvised apparatus and modified game forms all aimed at skill training and co-ordination. *119 photographs and diagrams 8s.*

★

LEARNING TO WRITE ENGLISH

B. LUMSDEN MILNE

This series of nine graded workbooks has been prepared to help children to express themselves correctly in written English. The books are intended to supplement the basic English course, and the exercises range from simple questions to be answered with the help of pictures for children who have recently started English – to advanced grammatical work for school-leavers. *Books 1-2: 2s 3d each; Books 3-4: 2s 6d each; Books 5-6: 2s each; Books 7-9: 2s 4d each.*

★

READING ALOUD

JAMES GIBSON and RAYMOND WILSON

Normally, little practice is given to the important skill of reading aloud, and in this book, designed mainly for pupils between the ages of eleven to fifteen, two experienced teachers have collected verse and prose for Choral Reading. The main purpose has been to provide material which the boys and girls will enjoy and which will lead to an improvement in their reading aloud. *6s 6d*

★

LOOKING INTO THINGS

R. J. CANDY

A series for children of about 9-10, explaining how various objects are made, and how they work. A page of descriptive text follows a page of clear, explanatory drawings. Each book contains fifteen topics, which include such things as a tractor, a washing machine and a camera—progressing from simple articles in Book 1 to more complicated machines in Books 2 and 3. *Books 1 and 2: 2 3d each, Book 3: in the press.*

London retail prices are given

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Manganese Mine In New Hebrides

(Continued from page 28)

Hebridean labour is scarce and unskilled. Nevertheless, the C.F.P.O. intends to use it to avoid large-scale immigration. At present the Company employs 70 indigenes, 70 Wallisians, 40 Tonkinese and 40 Europeans. In order to provide a more settled life for the workers from the Group, they are offered the same rate of pay that they would receive in Vila—20 to 30 francs CFP per hour for a 40-hour week—and houses are being built for them. Finally, the training aspect is emphasized to produced skilled workers.

Many welfare and social services are either planned or already established. Medical assistance is provided free for all employees, who are cared for in a unit staffed by a doctor and a qualified male nurse. A primary school will be opened, and playing field. A Catholic church has already been built in the village, and two local firms have opened stores.

Boost For Local Economy

Many difficulties had to be overcome to establish Forari. The total investment amounted to over 20 million metropolitan francs.* (Half of this sum was spent on equipment and supplies, and half on buildings and plant.)

This enterprise will provide new resources for the Condominium budget through export taxes (3% of the FOB value for the first three years, 6% for the next five years) and will also boost the Hebridean trade balance by bringing in foreign currency, while substantially increasing the local income.

* £stg. 1,448,226.

Rooted Cacao Cuttings For Papua And New Guinea Growers

In Papua and New Guinea, rooted cuttings of clonal cacao can now be purchased by growers at 2/- each from the Keravat Agricultural Station near Rabaul, the territory's main cacao research centre.

Over the past fifteen years many cacao trees at Keravat have been selected for their high yield and other desirable characteristics. Selections are known as clones, and limited plantings of clonal cacao have been made on private plantations under close Departmental supervision. This was done to test the clones under standard plantation conditions. The results have been sufficiently promising to justify the wider distribution of clonal cacao now being made.

This is the first time clonal cuttings have been available from the Department of Agriculture. They supplement the sale to growers of cacao seeds, now at the rate of 3,000,000 a year.

SPC Plant Exploration And Introduction Activities Commended

During the Tenth Pacific Science Congress held in Honolulu in August, the following resolution was passed:

"Whereas international co-operation in the field of plant exploration and introduction, particularly on what concerns tropical crops and especially the coconut palm, is essential to the betterment of agriculture in the tropical part of the Pacific basin, be it resolved that the Food and Agriculture Organization of the United Nations and the South Pacific Commission be commended for their efforts in this field."

PICTURE CREDITS

Front cover, 44, 45, 46, E. P. W. Marriott; 18, 19, 20, 21, Masao Miyamoto, University of Hawaii; 22, 23, British Solomon Islands Official; 24, 25, 37, 38, 39, Jan Coenen; 26, 27, 28, Department of Mines, Condominium of the New Hebrides; 33, 48 (bottom), Netherlands Official; 34, 40, 41, 54, 55, Fiji Official; 42, 43, 49-53 incl., 56-59 incl., Australian Official; 48 (top), van Leuven, Hollandia.

It is regretted that due to an oversight the photographs reproduced with the article, *Agricultural Development On Niue,* by F. J. van Westendorp, in the *Bulletin* for April 1961, were not acknowledged to Mr. H. A. Coleman.

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SPC Women's Interests Training Seminar Closes

The Women's Interests Training Seminar conducted in Western Samoa by the South Pacific Commission for forty-four women participants from fifteen territories closed on September 21.

The Commission's executive officer for social development, Dr. Richard Seddon, who organized the Seminar, returned by air to Commission headquarters on September 24, with members of the secretariat staff who had handled the administrative side of the meeting.

Dr. Seddon said that the Seminar had been highly successful, and would give major impetus to women's organized activities in the Pacific. "Coming as it did towards the end of the first three years of the Commission's women's interests project, headed by Miss Marjorie Stewart", he said, "the Seminar proved most useful in consolidating much that had been instituted in the various territories as the result of the Commission's active assistance. The direct exchange of experience among those actively engaged in this work, the series of training courses and workshops, an interesting programme of field visits, and the discussions led by international experts, all combined to make the Seminar a most valuable occasion."

At the end of the Seminar, delegates approved a series of recommendations for the further expansion of women's work in the Pacific on a widening basis of social and community education involving the partnership of men and women in social, economic and civic activities.

(An account of the official opening of the above Seminar appears on page 29 of this issue.—Editor.)

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